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BACKGROUND

THE Papago Indians, in the deserts of southern Arizona, were 221
an agricultural people, thoroughly adapted to farming and food 241
gathering in an arid country, yet they were obliged to be seminomadic. There were no rivers in their country, and they had to "follow the water" in order to keep alive. They spent their winters camping near small mountain springs, in shelters which were often roofless, guarding their few possessions from the wind, but exposed to the southern sunlight. When June brought a ripening of the giant cactus, nourished on the water in its fleshy trunk, they flocked to the hills to collect its fruit. Finally, with the first July showers, they migrated to the open plain, where their domed brush huts were clustered in permanent villages, uninhabited except in the rainy season. Here they could stay as long as the summer cloudbursts filled their primitive reservoirs and softened the rocklike adobe of their fields. When the corn, beans, and squash were harvested and the reservoirs were dry, they returned to the mountains.

This was their life practically up to the present generation. They 177
were first visited by Kino, the Spanish missionary, in 1691, and 648
after that they had sporadic contacts with Spanish whites during two centuries and a half. Yet their desert was too uninviting to be made a goal of empire, and they were never "reduced," like their Uto-Aztecan kinsmen of Sonora. Even when half their country became American, by the Gadsden Purchase of 1854, they remained almost unvisited. White pioneers streamed along the Gila north of them, bringing profound changes to the Gila Pima, their blood brothers. Still the "Desert People," as the Papago call themselves, remained aloof and almost unknown. They had not even a large reservation until 1917. No wonder they have retained almost to

[p. 3]

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CEREMONIES TO PROMOTE GROWTH

● 241 IMMEDIATELY after the rainmaking ceremony, planting might begin. The Papago planted corn, squash, beans, and tobacco, and every stage in the growth of these crops, as well as in that of the wild ones that mature at the same time, was encouraged by singing. But there was great variation in the method. In some villages all the men met regularly during the summer "to sing up the corn"; in some the magic was left to the individual planter, and in some the shaman was called in for the purpose.

SHRINE OF THE FLOOD CHILDREN

773 At Santa Rosa the communal ceremony is still kept up. This village shares with Archie, Anegam, and Akchin a shrine dedicated to the four children once sacrificed here to prevent a flood.[1] The story, told among most groups of Papago and always localized where the shrine now stands, is as follows:

773 x 539 Once, in the desert near Archie, a hunter was pursuing a badger which had dived into a hole. The man tried to dig it out, but the hole grew larger, and a strong wind issued from it. [Some versions say, instead, that water issued.] The "big man" called the people together, and they talked for four nights about what to do, without being able to decide. Then the old men said: "Let us put into the hole the most valuable thing we have, and perhaps the wind (flood) will stop." So the people were asked to bring what they had, and they brought beads, deer tails, and eagle down. But the wind (flood) did not stop,

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[1] See p. 10.

[p. 68]

x796 bathed. The keeper of the smoke went through the usual retreat, involving fasting and solitude for four days, and then he also bathed. If the augury had been inauspicious, the ceremony might be held again when the saguaro was in bud, about a month before the drinking ceremony.

Kaka had also a ceremony when the corn was well up and before the tassel was formed. Corn effigies were made of painted sticks and placed in the council house. Then twenty boys and twenty girls, painted and dressed as in the previous ceremony, faced each other in two rows, boys and girls alternating, and danced backward and forward. This is the same general performance as the autumn cleansing dance, which purified the meat and the harvest crops. After it [784] was over the dancers bathed and abstained for four days from meat, salt, and sexual intercourse. The informant was uncertain whether the bundle was opened on this occasion, but it seems likely that this act formed part of the ceremony.

The Kaka songs were on the usual scraping-stick pattern.

x796
x539

27. *Hi hianai hu!*
All together, all together, all together
They sing.
He! All together they sing
Hitcia háhina.
All of them, the white beans,
Together sing
Tcianai hiu.

Hi hianai hu!
All together, all together, all together
They sing.
He! All together they sing
Hitcia háhina.
All of them, the red beans,
Together sing
Tcianai hiu.(3)

● 241 When corn planting time arrived each man sowed his seed without further communal ceremony. He stood at the edge of the corn field, perhaps with a group of kinsmen who were aiding him, and 241 sang:

15. Here I put my hand in my pouch, [539]x
And downward I go dropping [the seed].
Here upon our fields
A [clump like a] feather headdress
Comes forth.(20)

Then, as he walked down the first row, dropping four seeds into every hole made by his digging stick, he might address the corn.

16. Hail! I shall drop you in the ground. [539]x
You will come out and will ripen.
From elsewhere my relatives will come,
Will arrive, and will eat you.(5)

Sometimes the individual continued to sing at each stage of the growth of the corn and the squash. "He would walk about the field at night, quietly singing." Or he would stand at the edge of the field at dawn, and sing before starting to work. His songs might be any of those which were used for community singing.

At Tecolote, in the southern part of the reservation, growth [789] magic consisted, not in opening a sacred bundle, but in making effigies to represent the crops, both cultivated and wild.[a]

A series of communal meetings were held during the summer to 796x "sing up the crops," and for days beforehand all the men were 778 busy making representations of the expected fruits. A corn ear was carved from a section of giant cactus rib, with the long leaves of the yucca to serve as foliage. Squash was made from flexible ocotillo stems covered with buckskin, dyed yellow. Beans might be small spotted pebbles. Giant cactus and cholla fruits were made of clay and painted wood.

A fire was built in front of the council house and the fruits were 796x laid in a row to the west of it. Still farther west sat all the available shamans, and beyond them were the singers, with basket drums and scraping sticks. Usually an old man who knew the legends of corn

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[a] Cf. the facsimiles of corn and squash offered by Hopi and Zuni to induce increase. Parsons, 1939, p. 316.

73 took from his heart an ear of corn, and the clown, a squash. Coyote, x 58 who followed them, reported this to Elder Brother, and the latter decided to invite them back. But they were angry and said they would only come in summer. The rest of the year the people would starve.

The turtle now lives in the south, and Navitcu lives in the north, where he speaks a foreign language. But he taught the people to request favors of him by giving him cornmeal. When this is done, he never refuses.

Once a medicine man had a proud daughter who refused all suitors. The wind, who was among them, blew her up to the top of a high precipice and left her there. Her father, in despair, gave cornmeal to Navitcu, who came underground to the foot of the precipice. He took squash seed from his heart, planted it, and sang:

36. Yonder a rock came out;
Here it came out.
What did I loudly sing?
What did I loudly shout?
I came forth.
I ran hither.(27)

The squash vine grew up to the top of the precipice, and the girl climbed down it.

● [249] This and other songs connected with the story serve as special squash-growing magic.(37)

Most of the songs referring to wild crops have been lost, but two are recorded.

GROWING SONG FOR GIANT CACTUS

37. The big mothers stand there.
The big mothers stand there.
Whitely they flower.
Black [the blossoms] dry.
Red they ripen.(20)

CHOLLA GROWING

38. Many chollas came forth.
Many chollas came forth
Then I, having seen,
Thought it well.(20)Ed.10.

x 796 this time from the *pitahaya,* which ripens later than the giant cactus. The liquor was set to ferment the day before the ceremony, and it was the *wiikita* itself which assisted the fermentation.

The people arrived in the afternoon of the eleventh day. At this time, instead of a universal singing of songs and a speech by the clown there was a ceremony called "shooting the food." Each householder made, in front of his dwelling, four piles of sand, and in the center he placed a pile of food which was to be blessed to give health during the year. The supernaturals who blessed the food were the ceremonial clowns, one of whom was called *kúatcu'k* (the finisher).

When the writer saw the ceremony, in 1931, the clowns were led in by a man carrying a long pole and dressed in ordinary clothes. With the butt of this pole he indicated the sand pile toward the east, and the first clown ran up to it. He wore the usual mask of white deerskin, with a tuft of turkey plumes. The rest of his trappings were superposed on ordinary blue shirt and overalls. These trappings were: a girdle of fringed deerskin, the fringes about 1½ feet long, ending in white sea shells, with four large cow bells interspersed; deerskin fringes, about 6 inches long at the wrist; six cloth streamers, four red and two blue, hanging from a neck band; a little sack of corn meal at his waist. His duty was to sprinkle corn meal on the sand piles. The guide with the long pole indicated the piles in the order east, north, west, and south. The clown then trotted up to each pile and sprinkled it with corn meal, uttering the word *ku-ŭh* in a high squeaky voice. This was to kill the sickness.

A second clown followed, also masked, but wearing his ordinary clothes. He carried a bow and arrow, with which he shot at the offering of food. This was "in imitation of the man who [241] first produced corn by shooting cholla with a bow and arrow." After the shooting, the food became the property of anyone who could snatch it first. This is somewhat different from the practice of Archie clowns, who beg for food and then keep it for themselves. The whole village followed the clowns, who went at a dog trot to important houses, performing the same ceremony.

At sunset all the people went to the dance ground. This was ens when they had fled from Zuni and found them by planting a 796x cottonwood tree, which grew to the sky. Thus, he escorted them 171 back to Zuni, but Molawia, the name of the festival, which commemorates the achievement, means melons.[42] The Papago Navitcu duplicated the *ne'wekwe* achievement. "The wind blew a beautiful girl up to the top of a cliff (a Papago myth element which has many different endings). The people, after holding a meeting every night, without deciding upon any means of getting her down, called on Navitcu. They sent a man to the north to sprinkle corn meal for him and he came, traveling underground as he always does. He took squash seeds from his heart and planted [241] them at the foot of the cliff. A vine grew up and the girl climbed down it. This is the origin of squash and why we sing to Navitcu when we plant it."(12) Like the *ne'wekwe,*[43] and like many other clown and *ķachina* groups, Navitcu can cure. A common explanation of disease among the Papago is the breaking of a ceremonial taboo, and the cure is a repetition of the violated ceremony or of some part of it. But Navitcu, usually spoken of in the singular in spite of his plural manifestation, is a healer *par excellence.* When he appears at the prayer-stick festival, people sit in rows waiting for his touch, and they also call for the impersonation at any time of the year. The function and mask of Navitcu are hereditary in certain families, as are those of the *ne'wekwe.*[44]

The ritually made "fields" among which these clowns disport themselves might well be an enlarged version of the altar made by the Hopi for the god of germination [45] and composed of sand mounds into which are stuck ears of corn and prayer sticks. In fact, at one Walpi solstice performance Fewkes describes an imitation cornfield, with plants on clay pedestals, to be knocked down by the water serpent and then given to the women as an augury of plenty.[46] The usual Pueblo sand altar is referred to sometimes at Isleta as "the village," and at Acoma as "the fields." [47] The making of large sand mounds like those of the Papago occurs, too, at Zuni during *sha'lako,*[48] and scalp ceremonial.[49]

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[42] *Ibid.*, p. 996.

[43] Cushing, 1920, p. 620.

[44] Parsons, 1916, p. 229.

[45] Fewkes, 1920, p. 594.

[46] Fewkes, 1920, pp. 608–9, 615, 617.

[47] Information from Dr. Parsons.

[48] Parsons, 1917, pp. 188–89.

[49] Parsons, 1924, p. 9.

621 (Group I. 5, contained a nephew of Ego's dead wife, who had moved because he needed more land. But having joined, for economic purposes, with a group of his affinals, he proceeded to have all his intimate relations with them and, even in winter, when he moved back near his blood kin, his relations were with the new group, not with the old. It was propinquity which determined intimacy.)

An old village was larger and contained more unrelated families but it was generally segemented into groups of kin who continued to build houses near each other and to unite for work sharing, almost as though they were a separate village. The selection of these groups was as dependent on economic chance as that of a new village for, though usually close kin kept together, some of them might, for reasons of land or housing convenience, become attached to a group of more distant relatives. Then they would throw in their lot with these new neighbor-kin and have their closest relatioships with them rather than with the old group.

Kin groups recorded for old villages are as follows:

Appendix I. 1 Ego
Three brothers
One sister
(A group of paternal relatives lived elsewhere in the village)

I. 2 Ego
"Near sibling" i.e. first cousin, side of house unknown
Father's younger sister
Father's mother' daughter's son to Ego's wife
Father's father's brother's son to Ego's wife
Two brother's of Ego's wife
Two father's father's brother's sons' daughters to Ego's son's wife
(In another part of the village lived relatives who were actually closer to Ego, i. e. two daughter's of Ego's younger brother with other relatives of his wife.)

I. 6 Ego
Younger brother
Younger sister
Younger sister's daughter

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Each biological family in a group worked its land in common, (at least until the death of the father) but on special occasions, such as planting and harvesting, they called in the neighbor kin and

were called by them in turn. Every one who worked received a 602
share of the harvest commensurate, not with his work but with 241
what the owner could spare. The more an owner gave, the higher 476
his repute and the greater his assurance of getting service in his
turn. For other activities, such as house building, the workers [342]
received only their meals but again they had the assurance of
future help.

Work sharing may be considered the basis of the whole arrange- [476]
ment but the group having been formed for this purpose, was kept in
running order by constant exhibitions of goodwill. These took the 431
practical form of gifts and gifts of the one commodity which the 602
Papago ever possessed in excess of their need: food. 621

When a hunter brought home a deer, he went to each main house and presented a portion proportionate to the size of the family there. If there were hunters in that house, his family would soon receive a similar gift: if not it would be any other food they could afford. But with such relatives, there was a distinct obligation not to cease giving even though there should be no return. The investment was a long term affair to be realized on in the future if not the present.

The women treated each other similarly. Whenever a special dish was cooked in one house, children would be sent around to carry portions of it to all the others. Some groups went so far that they interchanged such food gifts every day at the evening meal, the only heavy one. (App. I, 3 C and D. I. 8. C. D and E) "So you were never hungry. Even if you didn't cook one day, a dish would be sure to come in from some of the relatives." As the groups grew larger, not every house could be so treated. (I, 8, A & B). Then a woman would give regularly only to her husband's siblings (I. 3. A. 2; I. 7) with, perhaps, some old people who needed help. Or there might be family cliques and favoritism. (I. 3; I. 9). One woman, who happened to have both brothers and sisters nearby, "always gave to her brothers for she thought the sisters could cook for themselves." But even if certain families were not often included, a gift must be sent to them now and then to keep up good feeling. (I. 2. A; I. 4. A; I. 5. A).

The geographic group had ceremonial obligations as well as 621
economic ones. Every Papago youth was expected to become a 783
"ripe man" through the performance of certain ceremonial acts
which conferred a blessing but also subjected him to supernatural
dangers. In both danger and blessing the kin were thought to share
and therefore, while the youth fasted and bathed to purify himself,
the kin abstained from salt and bathed also. When I inquired what

Pa 439 Gila. The Mexicanization of southern Papagueria can be laid largely to these winter trading trips. However, the people with whom trade was carried on were the Mexican Papago and the method was essentially Indian.

Trade with the Yuma was less frequent but of old standing. In 1698, while Kino was at Kuitatk, an old woman trudged into town from the west, with a pack on her back containing snails and little shells from the sea which she herself had brought from there.[1] She had probably been close to Yuma territory.

LABOR

Pa 464 465 Often what the Papago had to exchange was not goods but labor. Within the geographic unit, there was constant need for assistance in planting, harvesting, housebuilding, ditch digging, spinning, arrow making. Any individuals available gave their labor and their household was repaid in labor, goods or, sometimes, goodwill. But if no relatives were available, neighbors would be called on. The pay for such labor was return labor when it was needed and the meals eaten while working. But the meals were a very slight expense for "In old days people never ate much." For what was needed, there was abundance.

Pa 241 464 465 Harvest was in a class by itself for, at this time, the workers were often paid in produce. To invite relatives to help at harvest was a favor to them and families invited the distant ones seriatim in different years. Such an invitation meant a close tie and the family sometimes went into council as to who should receive it. The group in App. I, 5, took turns in inviting the wife's relatives and the husband's. As pay, they asked them to help themselves but the amount they took would be regulated by what they thought they could repay. One informant mentioned two sacks of wheat out of ten or "a pile" of unhusked corn or beans about three feet in diameter (21).

With the present scattering of Papago residence, relatives are not always available and neighbors are invited. No bargain is made but they are paid, as in trade, with whatever the giver can afford. "But those who are stingy can't get any one to work for them. I always have lots of help because I give a big pile of melons or a sack of wheat" (2).

Pi Pa 464 241 It was on this same basis that the Papago worked for other people and, since their most constant employers were the Pima, we may assume that the pay was calculated in the same way. The River

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[1] Bolton, 1936, p. 390.

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People, before their water failed, had such large and constant crops that one who wished could pay in produce to have all his heavy work done and could still have plenty to live on. Many of them had relatives in the neighboring Papago village groups of Archie, Kuhatk and Perigua and, as far back as tradition goes they have called on them to help with the work. But in the middle eighties, Pima agriculture grew to large commercial proportions, when thousands of bushels of wheat were sold to passing American pioneers. The Pima, with their hands full, sent for more and more Papago workers until it became the regular thing for the northern villages to be almost depopulated at wheat cutting time and for the roads to be filled with covered wagons going to Pima country. Each Papago family traveled and worked together and each had its regular employers, whose attitude was that of relatives or feudal protectors.

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The trek to the Gila began in May, the time for cutting winter wheat. This was also the end of the dry season when the Papago were almost out of food and it meant, for some families, release from starvation diet. The work lasted about three weeks with a little time more for trade and for cutting basketry willow which did not grow in the desert country. The pay, in wheat, settled down to about two sacks to the acre. The workers came home in July to have their rain ceremony and do their own planting and sometimes they returned before winter to plant for the Pima, to harvest and to pick cotton.

With the failure of the water, after 1774, Pima agriculture lessened and, in some districts, stopped. This had its repercussion on the Papago and helped in turning the northern villages toward cattle raising, which they had left largely to the south. But the habit was very strong and, though cotton raising has ceased and wheat has much lessened, many families still make the yearly journey.

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The southern villages turned to the Altar valley much as the northern ones did to the Gila, with the difference that the relationships here were not so close. Apache raids and White influence broke up the Mexican Papago organization so that the employer was usually a stranger and not a relative. Nevertheless families formed permanent relationships and would go every year to camp outside the same town and work for the same people. The work was harvesting and threshing beans, harvesting and drying squash corn and peppers. The pay was a share of the produce. But there were also a few chances for range riding, work with skins and casual day labor for which the pay was money. Sometimes a family would camp outside a Mexican town, getting work when it could, otherwise hunting and making pots and peddling the product. All these

Then the spider sang to me: 159x 787

Gray spider
Magic making
At the cave entrance hanging
Do not think I shall fall.
Twice I go up and down
And I return again
Therefore I am hanging, hanging here.

159x 224 241 Our men went to hunt deer on the hills, because those summer days are when the does are big with young and taste sweet. Or else they worked in our field. There were so many men that we girls did not have to help weed the corn. But we took cactus syrup out to the field, mixed with water, that the men might drink it while they knelt on the hot earth, pulling a mesquite stick to and fro to cut off the weeds. They were going to be medicine men, all three of our husbands, and perhaps they already had visions, but they worked like other men. Ah, that was a clever household! Three medicine men and one man-woman.

159x 838 We girls used to spend all day with that man-woman, Shining Evening. She went off with us to gather plants and she could carry more than any of us and dig longer. She ground corn with us, all taking turns at my mother-in-law's grinding slab.

Our husbands used to tease us girls. "How do we know these children running around the house belong to us! We are away in the mountains all the time and in the fields. It is Shining Evening who is with the women." Then they would laugh and say to the babies: "Run along! Over there is your daddy!" When they got us alone they would say: "Is he really all right?" We said: "Yes, Just like a woman. We have forgotten he is a man."

159x 221 464 When the summer was over and the pond dried up Where the Water Whirls Around, we took our babies and went moving over the hills, following the water. Over the mountains where you call it Mexico, there were more of our people who had water ditches in their fields. We worked for them and they gave us food. With many other villages we went, as if to war, because of the Apaches. We sent word all around with little sticks, ten or twelve, so that people might count them and know the day when we were going. Then we started out, the children and the bedding and a small grinding stone on a horse, and we women running beside with our carrying nets, with all the pots, and perhaps the baby on top. Far up in the hills, our husbands went running with their bows and arrows, looking for deer, and sometimes they met us with loads of meat on their backs.

Chapter III

MAKING A LIVING IN THE DESERT

241 IT IS obvious to the casual visitor that, even today, making a living in Papagueria demands continuous hard work and careful use of every available resource. Up to the eighteenth century the Papago were semisedentary farmers, who supplemented agriculture with hunting and the gathering of wild plants. Their way of life depended upon making the best use of rainfall and run-off, for the few year-round sources of water were in the mountains. Corn, beans, and squash were planted in small fields in the valleys where the washes fanned out, and, when the July rains came, the flash-flood waters spread over the ground. In many places flood waters were led from the wash to the fields by short ditches, but year-round irrigation was not possible because the washes ran only after a heavy rain. As noted in chapter ii, there is some evidence of an effort to canalize water from the mountains to the fields.

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221 The people could remain in the valleys as long as there was water in the *charcos*—which were the only source of water except the flood waters of the washes. When the *charcos* dried up, the villagers moved back to the permanent springs or shallow wells in the mountains. In September and October the Papago harvested their crops, dried what was not immediately used, and stored it in baskets which could be transported easily.

222 Wild plants were an important supplement to field crops, and from April through September much time was spent in gathering them. In the spring the cholla cactus buds were dried and stored, to be boiled and eaten later. In April a kind of wild greens matured. In May and early June came the important saguaro harvest, when families camped in the foothills and picked the juicy fruit from the tops of the tall cacti. Some they ate fresh, and some was dried whole to be used later as candy, though the greater part was boiled down into jam or syrup, and stored in jars to be used as sweetening or to be fermented into wine during the rain ceremony (see chap. vi). In July and August some of the people crossed the Baboquivari Mountains to the high grassland and

animals if income is to be raised and the range preserved, has been firm in 231
insisting that the number of horses on the range should be governed by the 177
need for them. In the face of much opposition and with the aid of jail sentence for noncompliance, they have seen to it that horses afflicted in a recent epidemic of dourine were killed and a strict quarantine maintained.

Furthermore, many of the flash-flood farms are now endangered by siltation resulting from soil erosion due to overgrazing of range lands. Hence stock reduction and the introduction of better grasses will help even those families which have no stock.

The Extension Department has been of great assistance to the Papago in improving their fields and herds. The latter has not been and will not be an easy task, for to the Desert People cattle are not a source of prestige. Cattle provide food and spot cash, but there is yet little of the attitude of making a paying business of cattle production. Furthermore, the Department will meet with at least tacit opposition for a long time, since white men's methods sometimes run counter to the old beliefs. Many Papago, for instance, think that their range is in poor condition, not because they have too many animals or because of prolonged droughts, but because so many horses have been killed off
in recent years. The horse is endowed with magic powers, and the white men [825]
are only asking for trouble when they slaughter sick animals. Only long and patient education—of adults in the villages and of children in the schools—can dispel superstition. The Agency is well aware of these difficulties, and the staff has made conscientious efforts to explain and to persuade, rather than to compel, progress.

Though the quality of Papago cattle is still in need of improvement, standards have risen measurably in the past decade. Until 1930 the steer with the largest horns was considered the best; and as late as 1937 skinny Spanish cows with a horn spread of several yards, looking like great gaunt deer, still peered from mesquite thickets. Today Hereford cattle constitute most of the herds, and under the tutelage of the Agency the Council has established a tribal herd of registered bulls which individual owners may use to improve the breed.

Cattle is the largest single source of revenue, providing 36 per cent of Reser- 434
vation income in 1940 (the last year before war wages and prices began to dis- 231
tort the normal picture), but agriculture is still the backbone of the Papago 241
economy. Over half the twelve hundred Papago families do not own any cattle at all, and only a sixth obtain more than fifty dollars from this source in a normal year. On the other hand, almost all families do some farming. The estimated cash value of the products is small and forms only a sixth of

[Text continues on p. 35-Analyst]

total Papago income, but farming furnishes basic subsistence for over three- 434
quarters of the families on the Reservation. It is now believed that cattle will 231
never be fundamental in Papago economy but should be regarded as a sup- 241
plement to the real basis of Reservation life—farming.

Other sources of income are few. About 6 per cent of tribal income (includ- 434
ing subsistence) is derived from firewood and fenceposts cut from mesquite. 313
There are known small deposits of gold, silver, lead, and manganese on the 316
Reservation, but they are in the hands of whites and offer nothing but a little employment to Indians, as the Papago have only surface rights to their land, and any mineral rights belong to the federal government. (Any miner may acquire rights on payment of rental of the land and fees for destruction of property.) This is a sore point with the Papago, since they are the only Indians who do not have rights to minerals under their lands.[4]

Handicrafts furnish a small part of tribal income—about 3 per cent. The 434
bulk of this income comes from the sale of baskets and pottery[5] through the 285
tribal Arts and Crafts Board, which was established under the auspices of the federal Indian Arts and Crafts Board to provide a market for Papago handiwork. Papago baskets, made of yucca, willow, bear grass, and devil's-claw, are of the close-coil type; decorative design in black and white, with occasional green or red, is simple but often strikingly beautiful in its sharp contrasts. Through assisting the Papago to improve their work and get better prices for it, the Arts and Crafts Board should help to raise Reservation income. It should also give the Desert People experience in co-operative business which may serve as a foundation for ventures in other fields.

There are a few small Papago business enterprises on the Reservation, most 434
of them trading posts, but returns from these stores are a minute fraction of [441]
tribal income. An increasing share of Papago income is from paid labor. As 464
previously stated, for generations the Desert People tided themselves over lean years by going to Mexico or to the Pima country to work for ranchers or farmers, who paid them in food and seed. Now, however, wage work (and cattle sales) are shifting Papago economy from a barter to a cash basis. Em-

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[4] The reasons for this anomalous situation are partly political. Under the Gadsden Purchase Treaty of 1854, the United States agreed to respect the laws and customs prevailing in the area under Mexican rule. Since Spanish days, mineral rights had belonged to the crown or the state. For two years (1932–34) Papago lands were withdrawn from mineral entry and claim, but renewal of the treaty provisions was made a part of the Indian Reorganization Act of 1934. Papago resentment is understandable, since some other Indian tribes derive substantial income from mineral leases. Known deposits on the Reservation are small, but there is always the chance of discoveries, since great copper deposits are being worked near by.

[5] The Papago also make rawhide ropes, wooden spoons, and other articles, chiefly for their own use.

[Text continues on p. 37- Analyst]

punctuated by an occasional fiesta,[1] a roundup, a death, or some other impor- 461
tant occurence. Life is slow and measured, without the rush of events and the crowded calendar of people who live close together as do the Pueblo Indians.

WORKING TOGETHER

Although Reservation lands belong to the tribe as a whole, the land in and 621
around each village is thought of as belonging to that community and is
apportioned by the village or district council. If a man wishes to put in a new 423
field, he must seek the consent of the village. Conversely, if a field has not been used for five years, the village can request the "owner" to take down his fences, or the request may come to the council from another man who wishes to use the field. The field or home site which remains in use is "owned" by the user, but, if he wishes to change either, he must obtain permission. Grazing areas also are thought of as belonging to the people of the village or the district, but an individual who has developed water resources virtually has first rights to the surrounding range and can shut off other people's cattle from the water. This general picture is complicated by the fact that certain areas were scheduled for allotment to individuals thirty years ago. Though the allotments were never approved, people know what land had been scheduled for them, and others hesitate to ask for its use.

Every village is organized for co-operative undertakings. For the care of 621
their livestock, the men elect a foreman who has proved that he knows horses 476
and cattle. This man, probably chosen from a prominent family in the village, 231
serves, as long as he performs his tasks to the general satisfaction of the community, without remuneration. During the big cattle roundup in October and the horse roundup in early summer (which may include a small-scale cattle roundup), the foreman "works for the people"; i.e., he has charge of all the proceedings—the day and place to start, the methods to be used, and all the activities to be carried on by the village men and boys. He is responsible for seeing that the proper brands are applied to calves and colts, a process that is carefully scrutinized by the cowboys. The foreman also decides what other co-operative work should be done to protect and improve the villagers' livestock; and when he thinks a corral should be built or a *charco* improved, he summons the men to come and help.

Another type of co-operative work is keeping the washes clear of brush and 621
sandbanks, so that they will not turn out of their courses or deepen their 476
channels, leaving established fields useless. All the men whose fields are 246

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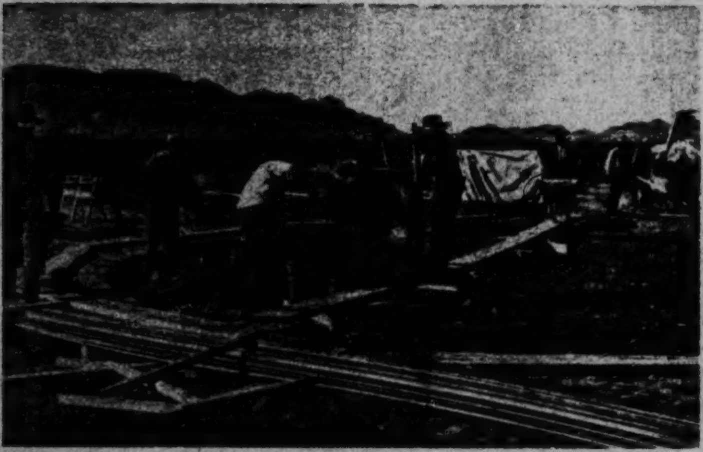
[1] The fiesta, the chief religious and social event of village life, is described in the following chapter.

621 watered by a wash are responsible for keeping it cleared; each must see to that
476 portion which runs through his field.

241 Keeping fences in repair is also often a co-operative job. When a single fence divides the fields of two men, they share the work and expense of keeping it up; however, a fence or part of one which runs along only one man's property is his responsibility.

PLATE VIII

[312]



United States Indian Service

WORKING TOGETHER

The white man's way: paid labor. Pouring concrete
for a community stock tank, a CCC project

621 In Topawa there are two other community enterprises: the blacksmith
476 shop and the village well. The shop, a corrugated metal building situated in the
312 center of the village and well stocked with tools, was built with government
326 funds at the request of the village, but it is the people's responsibility. Two men keep the keys, and any villager who wishes to use the shop is free to do so. The well, at which all the stock are watered when the *charco* goes dry, was also built by the government and is operated by the village. One man is responsible for running the motor and keeping up the supply of water, but each household contributes money to buy gasoline.

5: Castetter & Bell N-5 (1938-1940) 1942
NU28 Papago
Prehistoric
Southwest NT3
Pima

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irrigation indicated by old ditches and reservoirs at Santa Rosa.

HISTORICAL AND ETHNOGRAPHICAL EVIDENCE

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When Kino and Mange[12] made their first explorations in Pimeria Alta, the Pima on the Gila and the Sobaipuri in the San Pedro and Santa Cruz valleys were carrying on agriculture by means of canal irrigation, and an extensive system of ditches was observed by Font and Garcés[13] among the Pima of the Casa Grande-Casa Blanca district in 1775, also along the Gila in 1846 by Emory and in 1852 by Bartlett.[14] However the historical accounts indicate the agriculture of the Gila and its tributaries was of a lower cultural level than that of the irrigated valleys of Sonora. Nevertheless, Pima and Papago were rather good farmers and developed their agriculture to a fairly high degree of efficiency—a condition which still applies, particularly to the Papago. In fact the Papago had to be efficient farmers to wrest a subsistence from so reluctant and forbidding an environment. After the period of disorganization and migration contingent upon Apache raids, which preoccupied Pima and Papago from about 1750 until the Apache were finally subdued by the Federal Government in 1874, Piman agriculture slowly revived from the severe setback which it had suffered, and, at present, irrigation is practiced in the same river valleys where the Spaniards found it, although in portions of these valleys the Indians have been displaced by whites.

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The basis of Pima subsistence has become greatly modified since aboriginal times, much more so than that of the Papago, who because of their isolation as well as the limitations of their environment have remained relatively unaffected. In fact Pima economy has undergone such radical change over so long a time that it is now difficult to recon-

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[12] Bolton, *Kino*, I, 205; Mange, *Luz*, pp. 248-49, 258.
[13] Bolton, *Anza*, IV, 45; Coues, *On the Trail*, I, 107.
[14] Emory, *Notes*, p. 81; Bartlett, *Narrative*, II, 232.

5: Castetter & Bell N-5 (1938-1940 1942
NU28 Papago NV28

174 241 312 Papago agriculture, involving no storage of water, was characteristically of the primitive but efficient *de temporal* "thunderstorm" type; that is, flood-water farming in which seed was planted in moist ground at the mouth of a wash after the first rains, which came in summer. This was reported as early as 1694 by Mange[30] at El Tupo, Tucabavia and Gubo, and there is a specific statement[31] to the effect that this was the customary method of planting by the Papago north of Casas Grandes. Kino reported the same for the Papago at San Rafael del Actúm Grande.[32] Although Gaillard[33] observed in 1894 that the Papago irrigated their crops with water drawn from natural or artificial dams, which he terms respectively *charcos* and *represos*, we have been wholly unable to confirm this practice, all our information being to the effect that such stored water was used only for domestic purposes. He gives the impression that this was the customary method of watering crops and makes no mention of flood-water farming. Bryan[34] points out that the difficulties of profitable storage of water in sufficient amounts for irrigation in the Papago country are very great. Also he has informed us in personal correspondence that he has seen no evidence that the Papago ever stored water for irrigation of fields.

174 241 To be sure, Papago agriculture was quite uncertain due to irregularity of the rainy season, then later on account of Apache raids. In years when rains were late these Indians lived entirely on wild foods without planting at all. So tenuous was Papago agriculture that Mange,[35] head of a military detachment detailed to escort Kino, in a number of places asserts that in the late seventeenth century certain *rancherías* in Papaguería had no agriculture, living entirely on wild

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[30] Mange, *op. cit.*, pp. 215, 229-30.

[31] *Documentos*, 3rd ser., IV, 833.

[32] Bolton, *op. cit.*, I, 309.

[33] Gaillard, *The Papago of Arizona and Sonora*, p. 293.

[34] Bryan, *op. cit.*, p. 143.

[35] Mange, *op. cit.*, pp. 216, 225, 265, 286-87.

products. However, his visit may have followed a season Pa
when no crop was planted on account of late rains, such as 174 241
Kino[86] cited in 1701 in the vicinity of San Rafael del Actúm
Grande (in southern Arizona), where no maize had been
raised by the Papago that year because of a like situation.

All our informants agreed that wild plants and animals Pa
formerly constituted a much larger, and much more depend- 174 262
able, fraction of the total Papago food supply than did cul- 222
tivated plants. Seasonally women devoted themselves to the 224
gathering of wild foods while men and boys hunted rabbits.
When the wild foods ripened, large quantities were gathered
and stored, but, just before the giant cactus harvest, food
became very scarce, as indicated by one of their names for
the period that would correspond to our month of May,
ko'ohk macat, "the painful moon." One informant said that Pa
when he was a boy it was not uncommon to "be so hungry [261]
that a person became dizzy when he stood up." As in the past,
so today, the Papago utilize much more wild plant and animal Pi [262]
food than do the Pima; in fact, it is now comparatively rare [222]
to find the Pima gathering wild foods of any kind, while
many Papago still utilize them to some extent as a matter of
necessity, for Papago agriculture is today almost as precarious
as in olden times. Pa

Underhill[87] has well pointed out that poor as the Papago 174 511
country was, its economics were those of abundance. Much 431
the same outlook is still to be observed among the Pima, Pi
despite their deculturation. The Pimans did not hoard [511]
property; they were constantly making gifts, chiefly of food,
for their food supply, meagre though it seems viewed from
our standard of living, was more than sufficient for their
simple needs, and anything beyond the bare necessities for
sustaining life was regarded as a surplus. Papago migratory
life, involving the difficulty of food storage, added to the
problems of preserving food in so hot a land, greatly fostered

[86] Bolton, *loc. cit.*

[87] Underhill, *Papago*, pp. 90-2.

5: Castetter & Bell N-5 (1938-1940) 1942
NU28 Papago NU28
Pima NU29

Mexicans they more and more came to use Mexican goods Pa 174
and to pay less attention to agriculture, thus the arrange- 464
ment of family geographic units was disrupted.[40]

In lean years among the desert Papago the bulk of the Pa
harvesting on Pima farms was done by the Papago, and the Pi 174
custom of such labor for hire has continued until quite re- 241
cent times. However, desert Papago almost invariably 464
returned to their homes later as it was very rarely that these Indians lived outside their own village except by intermarriage. In ancient times the Pima usually had a rather large and dependable crop, but Pima agriculture was given a strong stimulus beginning with gold rush days in the fifties, and by the eighties the increased penetration of whites created a demand for crop production on a commercial basis. Thus the Papago almost abandoned the northern part of their desert territory to work for the Pima during wheat harvest on the Gila. This was always a great boon to the Papago for whom this time was the leanest part of the year. Here they remained for about a month, a fourth of which was spent trading and cutting willow for making baskets. For their labor the Papago were given daily food and a share of the crop. Although May and June, the time of wheat harvest, constituted the period of greatest Papago movement to the Gila, some of these Indians returned in late fall to assist in planting, and to pick cotton.

Despite the hiring of Papagos by the Pimas, due to commercial growing of wheat by these Indians, the northern Papago villages continued to be agricultural, adding the raising of cattle to the extent of supplying the amount of meat formerly secured by hunting. Moreover, here the arrangement of family geographic units remained intact.

One must not get the impression, however, that irrigation Pa
was a culture trait characteristic of Pima, Sobaipuri and Soba, Pi 174
but lacking among Papago. These peoples were one in speech 812

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[40] Underhill, *op. cit.*

5: Castetter & Bell N-5 (1938-1940) 1942
NU28 Papago NU28
Pima NU29

from the Baboquivari and Quijotoa valleys runs by a circuitous route through the Great Plain and unites with similar ephemeral streams in Sonora to form the Sonoita. Except for occasional floods the channel is dry for more than twenty-five miles to a point a short distance above Sonoita.[44] Similarly, irrigation was practiced at San Xavier by the Papago who occupied this village after the Sobaipuri had abandoned it within historic times. Maps in Bryan's[45] report and those in Hoover's paper show in parts of the Papago-Pima country the location of fields, streams, washes, springs, tanks, *represas* etc. Pa 174 312

The Papago continue to the present to pursue their *de temporal* farming much as they have always done, although Pima agriculture has undergone marked changes. The Federal Government, beginning in 1913, drilled wells in a number of Papago villages and such wells are now scattered throughout Papago territory, but they are used for watering stock and enabling residents to remain throughout the year, and have no bearing upon the growing of crops. In 1919[46] the desert Papago in Arizona were reported as flood-water farming about sixteen thousand acres of land, while those at San Xavier had about fifteen hundred under ditch irrigation, with water largely from wells. Pa 312 241

Three changes in Piman life, affecting both Pima and Papago, have been of the utmost importance in ameliorating their economic condition, even though the concomitant white influences have resulted in pronounced deculturation, notably among the Pima. The first of these was the introduction of foreign crops. The earliest to be received, and the most important for both peoples, was wheat. This provided an off-season crop, planted anywhere from mid-November to early February, depending upon the winter rains, and harv- Pi Pa 177 241

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[44] Bryan, *Papago*, p. 119.

[45] Bryan, *ibid.*; Hoover, *The Indian Country of Southern Arizona.*

[46] *Report of the Commissioner of Indian Affairs* for 1919, pp. 279, 287, 289.

5: Castetter & Bell N-5 (1938-1940 1942

NU28 Papago NU28
Pima NU29

Pi Pa 199 241 vested in May or early June. This also provided a more equable seasonal distribution of farm work and furnished a crop at a period of the year which heretofore had been very lean. The Papago for a long time, however, cultivated only small amounts of wheat and it has been only within the last few generations that wheat cultivation has deeply affected them. Pi Pa 199 312 The second is the digging of government wells convenient to many of the *temporales* and farms (beginning in 1913), in some cases with a resultant development of permanent villages around them. This also has meant termination of the annual migration to the hills which had been such a potent influence in Papago life; moreover it has made possible a more sedentary life with a sanitary water supply, and the inhabitants of villages with such wells are usually more progressive and more prosperous. Pi Pa 199 231 Important among these changes was the third factor—introduction of cattle. While this has been a boon to the Pima, it has been of more importance directly to the Papago, particularly in the eastern part of the reservation, where the stand of grass is better and the Papago now graze cattle for both home consumption and market. A pastoral economy is well suited to a scattered population such as the Papago. Cattle did not become important among the Papago, however, until the latter part of the nineteenth century. In the southern part of their area, where they had had cattle since Kino's day, several large ranches grew up, but in the north, which retained its ancient economy in a purer form, the raising of cattle was adopted more slowly. When the Jesuits left the Piman territory many of the domesticated animals went wild. Thus these Indians early had an opportunity to secure horses and cattle—a practice which began in Kino's day.[47]

By 1904 the Papago in southwestern Pima County were making their living chiefly by stock raising, while in 1908 many in Fresnal Valley were reported as having cattle, upon

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[47] Mange, *op. cit.*, p. 246.

5: Castetter & Bell N-5 (1938-1940) 1942
NU28 Papago NU28
Pima NU29

which they depended wholly for support. In 1919 it was estimated that the aggregate cattle holdings of the desert Papago were about thirty thousand head.[48] As late as 1846 the Pima were reported as having few cattle and these only for tillage.[49] Pi Pa 179 231

The modern Pima have profited greatly by the introduction of cattle; today they not only raise cattle for their own use, but more commonly rent their lands for pasturing cattle owned by the whites. The grazing of custom cattle by the Pima has steadily grown since November, 1932, when six hundred were secured from the Tremaine alfalfa ranch. In 1935 approximately 55,000 such cattle were on the Gila River Reservation, and during the winter months of the same year about twelve hundred sheep also were pastured there. Many of the Pimas now work for hire, as is true with the Papago at San Xavier, at Tucson and the copper mine at Ajo. Individuals of both groups eke out an existence or supplement their meagre income by cutting and marketing dead wood. Beginning in 1933 marked stimulus was given toward acculturation, particularly among the Papago, by the appropriation of emergency conservation funds. This is having far-reaching effects upon Papago as well as Pima economy and culture; it is transforming Papago economy from a gift and barter to a money basis and gradually raising their standard of living.

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It would be highly desirable to present an accurate statement of the amount of land anciently cultivated per family among Pima and Papago as well as the total amount of crops and wild food used annually per family or per person. Due to cultural disturbances and distortions, however, it is now very difficult to arrive at exact figures. Moreover the ratio between cultivated and wild foods utilized fluctuated con- Pi Pa 174 311 241

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[48] Curtis, *The American Indian*, II, 31; *Report of the Commissioner of Indian Affairs* for 1904, p. [illegible]; *ibid.* for 1919, p. 287.

[49] Emory, *Notes*, pp. [illegible]5.

5: Castetter & Bell N-5 (1938-1940 1942
NU28 Papago NU28
Pima NU29

Pi siderably from year to year, and the areal variability of soils
Pa and climate entered in. Thus the Papago village of Vamori
174 was reported by Clotts[80] as having a cultivated acreage of 7.03
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241 per person, but considerable allowance must be made for the fact that the fields there had quite poor soil. The Papago habit of seasonal movement between Wells and Fields and their migration to the Gila and the Altar to work for hire always has rendered difficult the obtaining of reliable popula-
Pi tion figures. Thus the reports of the Commissioner of Indian
Pa Affairs[81] beginning in 1863 variously recorded the Papago
161 population of Pimería Alta as follows:
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Year	*Population*	*Year*	*Population*
1863	7500	1885	7300
1865	5000	1895	2648
1872	6000	1903	2542
1875	6000	1911	about 5000
1883	7300		

Population on the reservation at San Xavier was reported as follows:

Year	*Population*	*Year*	*Population*
1865	(80 families)	1893	427
1882	250	1895	517
1883	500	1896	542
1885	250	1899	502
1887	137	1900	519
1890	363	1903	523

In 1858 Chapman's census listed the number of Pimas on the Gila as 4,117; in 1914 the number on the reservation at Sacaton was 3,796.[82] Part of the discrepancy in the above figures is due to allottees only being included in some cases, in others all the inhabitants of the reservation.

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[80] Clotts, *Nomadic Papago Surveys*, p. 80.

[81] *Report of the Commissioner of Indian Affairs* for 1863, pp. 385, 390; *ibid.* for 1865, pp. 135, 589; Clotts, *History of the Papago Indians*, etc., pt. III.

[82] *Report of the Commissioner of Indian Affairs* for 1858, pp. 554-60; *ibid.* for 1914, p. 77.

5: Castetter & Bell N-5 (1938-1940 1942
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acres per family (doubtless an exaggeration); in 1883 as from one-fourth to two and one-half acres; and in 1887 as ten acres which sufficed for the wants of the ordinary family.[84] Similarly, Russell observed in 1901 that Pima farms ranged from one to five acres per family, and more recently Southworth[85] indicated that Pima family plots varied from five to fifteen acres, and that in 1915 on the reservation at Sacaton this was close to ten acres, although some Indians might hold more than one such field. The Pima around Sacaton were reported as having cultivated about three thousand acres in 1854,[86] and the Pima population on the Gila was listed in Chapman's census of 1858 as 4,117. These two dates are relatively close, and if we assume the figures to be correct we arrive at a cultivated acreage of about three-fourths of an acre per person. It is our own judgment that in early historic times the cultivated acreage per Pima family varied from two to five acres. Moreover, it is certain that the average size of the Pima farm anciently was much smaller than at present.

The amount of land cultivated by the Pimas on the Gila River Reservation in 1854 was about three thousand acres; in 1919, 10,610 acres; in 1923, 8,965 acres, and in 1929 crops were harvested from 7,774 acres.[87]

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In a recent paper Kroeber[88] calculated a yield of fifteen to twenty bushels of shelled corn per acre in the aboriginal "agricultural east," the lower figure of fifteen being supported by the work of Hinsdale[89] for Michigan. Moreover, Kroeber concluded that the yield of one acre would be sufficient to support one person for one year. In this connection Voe-

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[84] Grossmann, *The Pima Indians of Arizona*, p. 418; *Report of the Commissioner of Indian Affairs* for 1883, p. 64; *ibid.* for 1887, p. 4.

[85] Russell, *Pima*, pp. 87-8; Southworth, *A History of Irrigation on the Gila River Indian Reservation.*

[86] According to Rev. C. H. Cook who began living among the Pima in 1870, Clotts, *op. cit.*

[87] *Report of the Commissioner of Indian Affairs* for 1919, pp. 84, 94, 146, 160; King and Leding, *Agricultural Investigations*, p. 5; King and Loomis, *Agricultural Investigations*, pp. 8-9.

[88] Kroeber, *Cultural and Natural Areas of Native North America*, p. 146.

[89] Hinsdale, *Distribution of the Aboriginal Population of Michigan*, p. 24.

5: Castetter & Bell N-5 (1938-1940) 1942
NU28 Papago NU28
Pima NU29

gelin[60] finds Kroeber's estimate of one acre of cultivated land Pi per person much too high at least for the Shawnee during the Pa eighteenth and nineteenth centuries, but does not dispute 174 his figure of fifteen to twenty bushels of corn necessary to 241 support one person for one year. Accepting the weight of fifty-six pounds of shelled corn per bushel (Pima-Papago corn averages three to four pounds less), Kroeber estimates that one thousand pounds of corn (in round numbers the annual yield of one acre, about eighteen bushels), or a little less than three pounds per person per day, should more than sustain the average person in a community composed of men, women and children.

Under early conditions Piman native corn yielded on the average only ten to twelve bushels of shelled corn per acre, although as grown by the U. S. Field Station on the reservation at Sacaton the same corn yields twenty to twenty-five bushels; teparies, under native conditions, five hundred to eight hundred pounds per acre—under Field Station cultivation, as high as fifteen hundred pounds; and wheat, an introduced crop, ten to twenty bushels with native culture, and forty to fifty bushels at the Station.

In our judgment the figure of 1.79 acres of cultivated Pi land per person as derived from the data of Clotts[61] is too Pa high when applied to the whole desert Papago area. Our 174 241 most reliable figures indicate that the desert Papago, before 311 white contact disturbed their economic pattern, cultivated 262 from one-fourth to a maximum of two acres per family. Allowing an average of twelve bushels an acre, this means a crop of about three to twenty-four bushels of shelled corn, or its equivalent in teparies and pumpkins, per family. Assuming a family size of five, this would allow about three-fifths to five bushels per person per year. In terms of Kroeber's subsistence level (eighteen bushels per person per year),

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[60] Voegelin, *The Place of Agriculture in the Subsistence Economy of the Shawnee.*

[61] Clotts, *op. cit.*, p. 8a.

5: Castetter & Bell N-5 (1938-1940 1942
NU28 Papago NU28
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Pi Pa 194 241 311 262

this would indicate the desert Papago cultivated food supply ranged approximately from one-thirtieth of the annual food consumption among some families to one-third of the total among others. Actually, however, the figure was somewhat less because of several factors: (1) On Papago cultivated plots not all the land was level and therefore portions of it were not tillable since they could not be flooded. This was particularly true at points where water entered fields and deposited silt; (2) Papago (and Pima) ate a large fraction of their corn crop in the roasting-ear stage and this reduced its actual yield in terms of total food value. This practice has rendered it very difficult to compute yield of maize per acre; (3) it was customary for Papago (and Pima) to gorge themselves when food was abundant, with little providence for the future. This resulted in such an inequable distribution of the crop that frequently this entire food supply was eaten up by the end of December.

On the above basis, our field and historical studies of the Pima level of economy from the standpoint of their agriculture indicate that anciently the cultivated acreage per Pima family was two to five acres. In arriving at this figure we are guided somewhat by the amount of land it was possible physically for a family to cultivate with primitive implements. Again assuming an average family size of five, we arrive at a figure of two-fifths of an acre to one and one-fifth acres per person, or five to fifteen bushels of corn or its equivalent per person per year. This would mean the cultivated crop supplied approximately from one-fourth of the total food requirements among some families to nearly the entire amount among others.

Pi 194 241 311 262

The conclusion we are forced to draw from our own field studies, as well as historical accounts as to the ancient basis of Pima subsistence, is that, before white contact radically disturbed the economic pattern, the Pima cultivated crop in average years comprised about 50 to 60 per cent of the total

5: Castetter & Bell N-5 (1938-1940) 1942
NU28 Papago NU28
Pima NU29

Pi 174 241 311 262

food supply, wild plants and animals constituting the remainder; thus food gathering was absolutely necessary to supplement the inadequate cultivated crop. Our estimate is supported by Russell's[68] statement made forty years ago that mesquite constituted nearly, if not quite, the chief native article of Pima diet in primitive times; also by that of Whittemore[69] that mesquite beans were the principal article of Pima food. Mesquite was a dependable food and the Pima ate it in abundance every year. Their aboriginal crops were maize, beans, pumpkins, cotton and gourds. In years of inadequate water supply or crop failure from other causes they were forced to rely even more heavily upon wild plant and animal foods. Their strong reliance upon wild foods, chiefly mesquite and sahuaro fruit, supplemented by screwbean and cholla buds and fruits on the plant side; plentiful jackrabbits and less numerous deer and mountain sheep, as well as fish (although they had less access to fish than did the Colorado River peoples) and beaver on the animal side, bespeaks that agriculture was not overwhelmingly their basis of food supply. Wild plant products had a much more important place in their diet than did game, the ratio being about three to one. Apart from the killing of rabbits, hunting never constituted a major occupation, but a hunter would usually get about a half dozen rabbits in a day's hunt.

Pa 174 241 311 262

On the basis of our similar studies among the Papago, it is possible to conclude that anciently these Indians in average years cultivated only about one-fifth of their total food supply, four-fifths consisting of wild plant and animal products, supplemented by such variable amounts of cultivated foodstuffs as were secured from the Pima and their relatives in the San Pedro and Altar valleys in exchange for labor. In years of poor crops the balance was shifted even further in the direction of native wild foods and reliance upon these relatives and friends.

[68] Russell, *op. cit.*, p. 74.
[69] Whittemore, *op. cit.*, p. 34.

5: Castetter & Bell N-5 (1938-1940 1942
NU28 Papago NU28
Pima NU29

Pa 194 241 311 262

Papago utilized considerably more native plant food than wild animal life, the ratio being approximately four to one; also more deer and less rabbits than did the Pima. These native plant foods were mainly sahuaro and organ-pipe cactus fruit, cholla buds and fruit, mesquite beans, seeds of ironwood and paloverde, certain greens and sand root. Several months of every year were spent by the women gathering and preparing wild plant foods, and every family spent three or four weeks in late June and July gathering sahuaro, the women doing the gathering and preparing the fruit, the men guarding camp and hunting rabbits and rats. Among animals their reliance was upon deer, and, in diminishing order, rabbits, antelope, mountain sheep, rats and larvae. A family group formerly had no more than one or two hunters, each killing about twelve to fifteen deer per year. Many families had no hunter, so the kill was distributed among the entire economic unit with which they were affiliated, ranging usually from two to ten families.

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Thus it is obvious that in normal years of crop production the Papago made much more extensive use of wild products than the Pima. In comparison with the Maricopa the Pima depended appreciably more upon cultivation and less upon wild products than did these neighbors on the Gila, to whom mesquite and screwbean are reported as more important than maize.[64] Bartlett[65] wrote in the middle of the last century that Leroux had ascertained the Pima were much better supplied with corn and every other commodity than were the Maricopa. The stronger emphasis upon agriculture by the Pima as compared with the Maricopa is attested also by the presence of extensive canal irrigation, while the Maricopa depended entirely upon the inundation of flood plains and sub-surface seepage.[66]

Although the agriculture of the Gila Pima and the Papago

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[64] Spier, *Yuman Tribes*, pp. 48, 58-9.
[65] Bartlett, *Narrative*, II, 251.
[66] Spier, *loc. cit.*

5: Castetter & Bell N-5 (1938-1940) 1942
NU28 Papago NU28
Pima NU29

was on a lower technological level than that of the irrigated Pa valleys of Sonora, these Indians were relatively good farmers. Pi Despite the fact that they, particularly the Papago, cultivated 174 241 small acreages, they did so intensively. The supreme Piman virtue was industry. The farmer arose before sunrise, worked without cessation until near noon and rested during the hottest part of the day, then continued work until dark. The heat prevented rapid labor, hence his toil was slow and plodding but unremitting.

* * *

Utilization of Native Wild Plants

In the Papago region certain wild staple foods grew in Pa abundance and were extensively utilized. Highly important 222 among these were the fruits and seeds of sahuaro *(Carnegiea* 262 137 *gigantea)*, and, in the southern part of Pimería Alta, organpipe cactus or pitajaya[67] *(Lemaireocereus Thurberi)*. Of such value was sahuaro that each family established a permanent camp in the nearest available cactus area; its significance is Pi Pa further indicated by the fact that sahuaro harvest marked the [205] beginning of the new year in the calendars of both Papago and Pima. Kino noted the extensive use of pitajayas in the Indian diet in traveling among Papagos from the Gila River to La Concepción (Caborca), as well as in the vicinity of San Luis Bertrando where he observed that the numerous pitajayas lasted the Papago until December.[68]

Another very outstanding food was cholla buds, fruits and joints, and some informants regarded cholla buds of even more importance than sahuaro fruit. Buds of the abundant *Opuntia echinocarpa* and of the jumping cholla *(O. fulgida)*, gathered in May, and the fruit, which ripened in late summer, were pit-baked and constituted staple foods, while the fruit and sometimes buds and young joints of the vari-colored

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[67] Pitajaya or pitaya here refers to the fruit of either or both *Carnegiea gigantea* and *Lemaireocereus Thurberi;* sahuaro invariably refers to *Carnegiea gigantea.*

[68] Bolton, *Kino*, I, 238.

5: Castetter & Bell N-5 (1938-1940) 1942
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CHAPTER IV

PIMAN CULTIVATED CROPS

Examination of the early literature reveals that Piman agriculture at the close of the seventeenth century, in harmony with the agricultural situation in the Southwest in general, centered around the maize-bean-pumpkin complex. Kino, Mange and others[1] repeatedly refer to the Papago, Pima and Sobaipuri cultivating and utilizing much maize, beans, pumpkins and in some places cotton. Although these Indians had gourds,[2] there is no specific reference to their cultivation. The early accounts do not record the growing or utilization of tobacco, and there is no indication that its culture was pre-Spanish. While *Martynia* for some time has been grown for use in basketry, it is uncertain whether it was cultivated aboriginally. Sunflowers were never cultivated nor even utilized. Although maize was the most important Piman crop, and could be utilized as food in more ways than any other, among the Papago the tepary bean approached it in value because of its tolerance of drought. As indicated by our own field studies, as well as the work of Forde, Gifford, Kroeber, Drucker and Spier,[3] there was considerable similarity between the crops and basic economy of the Pima-Papago and those of the tribes on the lower Colorado River.

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With the coming of the Spaniards various Old World crops were introduced into Pimería Alta, although it is clear

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[1] Mange, *Luz*, pp. 215-17, 229-30, 247-50, 258; Bolton, *Kino*, I, 187, 195, 207, 246, 255, 292; II, 207; *Documentos*, 3rd ser., IV, 838-39; Coues, *On the Trail*, I, 107.

[2] Bolton, *op. cit.*, 270; Wyllys, *Velarde's Relación*, pp. 133, 138; Mange, *op. cit.*, pp. 259, 263.

[3] Forde, *Ethnography of the Yuma Indians*, pp. 107-15; Gifford, *The Cocopa*, pp. 263-67; Kroeber, *Handbook*, pp. 735-37; Drucker, *Culture Element Distributions: XVII, Yuman-Piman*; Spier: *Yuman Tribes*, pp. 48-81; *Cultural Relations of the Gila River and Lower Colorado Tribes.*

5: Castetter & Bell N-5 (1938-1940 1942
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that at least wheat, flax and watermelons had reached part of the area before Kino's arrival in 1687. In order to furnish a more stable food supply for Indians at the missions, and to give them a more secure basis of economic prosperity and independence, Kino distributed seed of wheat, chick peas, bastard chick peas, lentils, cowpeas, cabbages, lettuce, onions, leeks, garlic, anise, pepper, mustard, mint, melons, watermelons and cane, as well as grapevines, roses, lilies, and trees of pear, apple, quince, mulberry, pecan, peach, apricot, plum, pomegranate and fig.[4] Some suggestion of the extent of his industry in getting crops planted and herds of cattle established may be obtained from his observation that in April, 1687, only about a month after his arrival in Pimería Alta, the Indians in Nuestra Señora de los Remedios were very disconsolate and did not wish to be Christians, because among other things the fathers required so much labor and sowing for their churches that no opportunity was left the Indians to sow for themselves, and so many cattle were pastured that the watering places were drying up.[5]

An interesting reference was made by Mange[6] to the effect that in June, 1694, in company with Kino and Gilg, he found the Pima Indians growing flax in the vicinity of San Miguel del Tupo, which had a lake and springs of water. Kino was very skeptical of its being flax, but this was later verified and, although not as fine as that cultivated in Europe, they concluded it was of the same kind. Thus Kino's surprise at the occurrence of cultivated flax in Pimería Alta indicates that it had been introduced into Mexico from Europe and moved northward into Sonora previous to his arrival in the area. A wild blue flax *(Linum Lewisii)* does occur in mountain valleys through the Southwest into Mexico, but we have no knowledge of its having been cultivated, except ornamentally by whites.

[4] Bolton, *op. cit.*, 122-23, 204, 248-49, 253, 321; II, 89, 100, 158, 165, 265.
[5] Bolton, *op. cit.*, pp. 114-15.
[6] Mange, *op. cit.*, p. 260; Bolton, *op. cit.*, p. 194.

5: Castetter & Bell N-5 (1938-1940) 1942
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As the penetration of foreign animals into Pimeria became very rapid soon after Kino's arrival, he quickly established a number of stock ranches with cattle, oxen, horses, mules, burros, goats, sheep and chickens.[7] A letter written by Salvatierra to Father Leal in 1699 notes that "already there are here eight species of animals from the other side, now acclimated to Loreto [in adjacent Lower California]."[8] However, as late as 1846 Emory[9] stated that the Pima had few cattle and these were used for tillage. Pi Pa 174 231 177

There is every indication that no antagonism existed on the part of the Pima-Papago to the introduction of foreign crops by the Spaniards, in fact they received them with enthusiasm. Although these Indians had a very high regard for their own ancient crops, the mere fact that the introduced ones produced well was all the justification needed for their acceptance. Pi Pa 194 241 177

The introduced crops which proved to be of greatest significance in early Piman economy were wheat, barley, watermelons and cowpeas, and in that order; the most important domesticated animals were horses and cattle. Although maize was anciently the leading crop the introduction of wheat gradually shifted the balance, and, among the Pima, wheat rather quickly came to rank first, maize second; among the Papago, maize continued to hold first place until about a hundred years ago because of the difficulty of adjusting wheat culture to the desert habitat. A perusal of reports of the Commissioner of Indian Affairs for the last third of the nineteenth century, with their tables showing the large yields of wheat in comparison with the small yields of maize for Pima and Papago, enables one to appreciate the marked extent to which wheat replaced maize in Piman economy.

In 1863 the Pima were reported as growing wheat, maize,

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[7] Bolton, *op. cit.*, pp. 122-23, 143-44, 165-66, 204, 321, 357-58; II, 150, 168; Manje, *op. cit.*, p. 309; Wyllys, *op. cit.*, pp. 128-29.

[8] Bolton, *op. cit.*, p. 223.

[9] Emory, *Notes*, pp. 83-5.

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barley, beans, peas, melons and pumpkins.[10] In 1846 Emory found them cultivating maize, wheat, watermelons, beans, pumpkins and cotton, and in 1856 he added to the list sugar cane and peas.[11] Similarly, in 1873 Grossmann[12] said of them "Wheat, corn, beans, and above all, pumpkins and mesquite-beans are their principal food," and indicated that wheat actually was their main crop, with barley, onions and cotton of lesser importance. Whittemore[13] wrote in 1893 that more than one hundred years before that time the Pima on the middle Gila raised maize, melons, pumpkins, cotton and "a small round seed which they ground and boiled as mush"; Lloyd[14] in 1903 likewise found them growing wheat, maize, beans, pumpkins, watermelons, peppers, gourds, tobacco, and a pea which was probably the chick pea (native cotton by that time had ceased to be grown). Although he observed that perhaps even more than maize or wheat the staple food of the Pima was beans, there can be no doubt that wheat was their leading crop then as it had been for a long time. This is supported by the statement of Russell[15] that wheat was their most important crop when he worked among them in 1901-02. Wheat continued to hold this leading position with both Pima and Papago, at least until 1924, and today ranks second only to alfalfa in Pima acreage. In 1919 the main Pima crops, ranked on the basis of cultivated acreages, were wheat, cotton, alfalfa (one thousand acres, practically all Hairy Peruvian), barley, milo and beans.[16]

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In 1907 the Coöperative Testing Station at Sacaton, on the Gila River Indian Reservation, was established through

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[10] *Report of the Commissioner of Indian Affairs* for 1863, p. 384.

[11] Emory: *loc. cit.*; *Report on the U. S. and Mexican Boundary Survey*, p. 117.

[12] Grossmann, *The Pima Indians of Arizona*, p. 419.

[13] Whittemore, in *Among the Pimas*, p. 52: although one cannot be certain of the identity of this plant, it is possible it was one of the semi-cultivated grasses known to the lower Colorado River tribes and to the Maricopa.

[14] Lloyd, *Aw-aw-tam Indian Nights*, pp. 58, 60.

[15] Russell, *Pima*, p. 90.

[16] King and Leding, *Agricultural Investigations*, pp. 5, 29.

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a coöperative arrangement between the Office of Indian Affairs and the Bureau of Plant Industry of the U. S. Department of Agriculture. The station was created for the study of agricultural problems of the Southwest with special reference to those which might have value for the Indians on the Gila River Reservation. Many crops have received attention, but the bulk of experimental work has related to the breeding, improvement and culture of Egyptian cotton.[17]

In 1923 only 8,965 acres of Pima land were in cultivation because of water shortage; likewise a census of Pima farms and crops on the Gila River Reservation in 1929 revealed that, because of lack of water for irrigation, crops were harvested from only 7,774 of the 29,530 acres of farm land available. Of these, about three thousand acres were in cotton, 2,100 in wheat and sixteen hundred in alfalfa. The yields on these acreages were 1,264 bales of cotton, 29,913 bushels of wheat and 4,790 tons of alfalfa. In 1935 the harvested Pima acreage was approximately 35,000, of which 24,000 acres were farmed by Indians. Of the latter, 1,443 acres were planted to cotton (American-Egyptian and upland types), 4,188 to wheat and 2,500 to alfalfa. Grain sorghums, Sudan grass, corn and barley also were grown on a considerable acreage for feed and pasture. Truck crops, consisting of beans, corn, tomatoes, onions and melons, were also grown for home use and, to a small extent, for commercial purposes. The field station has maintained a very productive strain of yellow Bermuda onions for about thirty years and the Pima have continued an interest in growing these, particularly for home consumption. Additional land is being brought under cultivation for the Pima, with family allotments of from ten to eighty acres, and an average of thirty.[18]

In 1878 the Papago were reported[19] as cultivating 2,500

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[17] King, *Crop Tests at the Cooperative Testing Station*, pp. 1-2.

[18] King and Leding, *op. cit.*, p. 5; King and Loomis, *Agricultural Investigations*, pp. 8-9; King, Beckett and Parker, *Agricultural Investigations*, pp. 9-11, 56.

[19] *Report of the Commissioner of Indian Affairs* for 1878, p. 298.

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Pa 244 197 acres of land and as having grown six thousand bushels of wheat, five hundred of corn and three hundred of oats and barley. Among the desert Papago the cultivated crops today are, in order of their importance, kidney beans (pinto and pink or rosa beans), Sonora and Early Baart wheat, maize (both flour and dent varieties as well as small amounts of flint corn), black-eyed beans, white and brown tepary beans, pumpkins (principally cushaw and cheese types), Anaheim chili, watermelons, muskmelons, a few varieties of lentils and small amounts of chick peas. In 1919 common pink beans were reported as a staple crop among the desert Papago, who in the previous year grew 1,800,000 pounds of beans and 300,000 pounds of maize. Most of the irrigated crops of the Papago are located at San Xavier, near Tucson. Here the chief crops were reported in 1904 and 1908 as being wheat and barley; in 1919 they were said to have raised ten thousand bushels of wheat, and 250 tons of barley hay. Today the leading crop is barley; also grown are wheat and alfalfa, as well as beans, pumpkins, maize, oats, very small amounts of cotton and tobacco, spinach, cabbage, onions, carrots, chili, a few potatoes, some apples, peaches and plums.[20]

Pi 244 For the past four or five years the principal Pima crops, in order of importance, with acreages, for the Gila River Indian Reservation follow:

Alfalfa (Chilean) for pasturage and hay	about 4,000 acres (1940)
In earlier years fair amounts of Hairy Peruvian were grown. Alfalfa is planted chiefly in fall.	
Wheat (Early Baart, Sonora, etc.)	2,600 acres (1940)
Cotton (American-Egyptian Pima and Acala)	1,200 acres
Field Corn (Mexican June and native types)	800 acres
Barley (Common and Vaughn)	700 acres
Grain sorghums (Hegari, Yellow Milo, etc.)	500 acres
Dwarf Hegari is the most popular.	
Beans (Teparies, Pima-Hopi limas and common pink beans [*frijoles*])	450 acres
Sudan Grass—for pasturage	?
Watermelons, muskmelons, pumpkins, onions, etc.	small acreage
Date palms, pecans, grapes, figs and pomegranates	small amounts

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[20] *Ibid.* for 1904, p. 148; *ibid.* for 1919, p. 287; Curtis, *The North American Indian*, II, p. 91.

The following information on the several crops is based upon numerous collections made in the field among Papago and Pima by the authors, as well as upon other field collections made by Ruth M. Underhill among the Papago. Determinations of types were made by the authors except as otherwise indicated. All lots have been deposited in the Laboratory of Biology at the University of New Mexico.

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As regards maize, the following were secured:

White soft	thirty collections,	several hundred ears
Yellow soft	five collections,	fifteen ears
Purple soft	three collections	eight ears
Red soft	three collections,	nine ears
White flint	two collections,	two ears
Yellow flint	three collections,	four ears
Pop corn	two collections,	several hundred grains
Sweet corn	two collections,	several hundred grains

In the twenty collections of brown and twenty-two of white tepary beans were found occasional seeds of other tepary types. There were three lots of pinto beans, four of common pink beans, three of common red or Colorado, four common yellow kidney beans, five of lima beans, six of cowpeas; also three collections of chick peas and two of lentils.

Twenty lots of seeds of cheese pumpkin, eighteen of cushaw pumpkin and one of *Cucurbita Pepo,* as well as six of gourds, were made; also eight collections of watermelon and seven of muskmelon seeds.

As to tobacco, we have three collections of plants of *Nicotiana trigonophylla,* and one of *N. attenuata;* one of seeds of *N. tabacum* and two of seeds of *N. rustica.*

Our collections include three separate lots of *Martynia louisiana.*

MAIZE

Maize was cultivated by the Hohokam,[21] who preceded the Pimans in the Gila Basin, and there are also archaeological specimens from sites on the fringes of the Piman area, such as Tonto Cave, Canyon Creek Ruin and sites on the

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[21] Haury, in Gladwin *et al, Excavations at Snaketown,* I, 158.

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Papago farming plots were almost without exception Pa
located at the mouths of washes,[8] where they could be watered 311
by flood water of the summer rains, and groups of relatives camped for generations at the same washes. In the Papago country every suitable plot of ground of this kind was utilized, and in many cases the plantings were necessarily very small. These pieces of alluvial land had few or no stones, and any found there were carried away in baskets to the edge of the field. They were not very particular as to type of soil, unless it contained considerable salts, for the deciding factor was the ease with which the land might be flooded during rains. Nevertheless these Indians knew that a good growth of weeds or the presence of large mesquite or paloverde trees indicated a good soil.

Clearing the Land and Land Ownership

Since Papago land was selected primarily on the basis of Pi'
its being subject to inundation by flood water, and tended to Pa
have a sparse cover of grass, it did not have heavy stands of 241
trees or shrubs. With primitive implements it was extremely difficult for either Pima or Papago to clear land of heavy growths of vegetation. Brush was first trampled, then allowed to dry, and burned, after which the roots were grubbed out with the planting stick and weeding hoe. Burning of any vegetative matter was thought to improve the fertility of the soil. Trees were known to interfere with the growth of cultivated plants because of their shade and extensive root systems, and were killed by burning brush in a shallow trench dug around the butt, never girdled mechanically. Dead trees might be allowed to stand in the cultivated fields, but usually were completely destroyed by continued burning.

Clearing new ground or old plots of weeds and debris in preparation for planting was men's work, in which women of

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[8] As used here a wash means a broad alluvial area over which the water, flowing down from the mountains in periods of rain, loses its momentum and spreads out.

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Pi neither tribe participated. There were no community fields,
Pa but families worked reciprocally. Among the Papago, these
241 family enterprises were under the leadership of a patriarchal chief chosen by the people for life, there being but one chief to each village. The Pima agricultural unit also was the village, and, as Hill[9] points out, the necessity of communal endeavor in irrigation and for protection against alien tribes tended to solidify these village units. They were under the control of a village headman whose office was inherited and who was responsible only to the chief of the tribe and to
Pi public opinion.

Pa Pima habitations were not then scattered as now. Families
241 lived close together on high ground for protection, particularly
361 after Apache raids became serious, and daily went out to work their plots as much as six to eight miles distant.
Pa During planting and hoeing periods they returned each night
Pi to their homes, but at harvest time camped at the fields.

241 Bringing a new tract of Pima land under cultivation and
474 irrigation required coöperation of the men in the one or
423 more districts which were to be benefitted, so as to arrange, dispose and dig the ditches. Under leadership of the headmen of the villages affected, meetings were held to plan the work. Hill[10] has pointed out that Pima land assignments under native custom were accomplished in two ways. When a large tract was to be developed it involved the coöperative efforts of individuals from one to three villages. Qualified men first selected the land and located the course of the canal. Then the community, under the direction of the headmen, constructed the canal from the river to the selected area. This completed, the men who had participated chose or were assigned plots of land under the supervision of the headmen assisted by an advisory body, but not all participants shared equally. The second type of assignment concerned a single individual. A man applied to the village headman, and a

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[9] Hill, *Notes on Pima Land Law and Tenure.*
[10] *Ibid.*

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plot was designated for him. In both cases assigned land Pi
became inalienable property of the assignee and his heirs. Pa ●
Use of the land was under the direction of the patriarchal 241 ●
head of the family, whose influence was partly inherited and 474
partly due to experience and personal magnetism, and whose 423
only coercive force was public opinion.

Our information indicates that, despite the above, any Pi
individual who wanted to and could develop a piece of idle, Pa
unclaimed land could do so without specific allotment. The 423
situation seems to be that aboriginally land was secured by inheritance or selected individually, and only more recently has allotment been practiced. Spier[11] is probably right in suspecting that distribution by allotment, similar to the Maricopa practice, dates from the time the Pima were located on the reservations.

Pima and Papago lands were considered as belonging to the tribe, although held individually. A person had the right to loan land in case he was not using it himself, but sale and, among the Papago, trade of land was unknown. In case of a loan no charge was made, and quarrels over the ownership or right to use a piece of land were settled by two men who knew the land and parties involved. Hill[12] has discussed the Pima procedure regarding the rental of lands. Neither Pima nor Papago ever resorted to pushing contests, tugs of war or stick fights to settle disputed boundaries, as did the Mohave. Difficulties over the limits of a Papago's land resulting from the washing away of the stones or stakes which marked the corners of his field were always adjudicated amicably by conference.

Personal ownership of land has been somewhat modified Pi
since post-Spanish concepts have disturbed the original situa- 428
tion. Anciently, however, title to the land was vested in men, and land was inherited essentially in the male line, although all members of the family had a right to its use and products.

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[11] Spier, *Yuman Tribes*, p. [illegible].

[12] Hill, *op. cit.*

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FENCING

Font[17] referred to the Pima fields being fenced in with Pa poles and laid off in divisions, but this was, of course, long Pi after the entrance of the first Europeans into the area. Simi- 419 larly, in 1846 Emory[18] noted the fences were of sticks, wattled 241 with willow and mesquite, and Bartlett,[19] a few years later, said their fields were generally fenced with crooked stakes, wattled with brush, chiefly mesquite, although he saw, at long distances from any village, large patches of wheat which were not enclosed. Aboriginally, Piman fields were never enclosed since there were no domesticated animals other than the dog. When a Papago patriarchal family developed a new agricultural settlement, each family head secured a field to care for himself and his sons, marking its corners with large stones or stakes. The first Pima fences were of interwoven willow, mesquite or other branches, supported by cottonwood, mesquite or willow poles, and these surrounded the land of a whole community rather than individual plots. Each family knew its own lands by their characteristic borders and ditches. At present, Pima, and to a less extent Papago, fields are enclosed with barbed wire. Pima fields were generally rectangular and Pi arranged according to the supplying irrigation canal, and Pa each family received a plot of the same width but varying in 241 length. Formerly the land of either a Pima or a Papago was ordinarily in one continuous strip rather than in scattered patches, although this has become modified, particularly among the Pima, due to trade and sale of land among the Indians themselves. There are a few recorded instances, however, in which a Papago family anciently owned land at two different Fields. Pima plots were contiguous, there being no vacant land between farms unless a piece were too high for irrigation or unsuitable because of soluble salts. Since floods

[17] Bolton, Anza, I, 265; IV, 48.
[18] Emory, Notes, p. 85.
[19] Bartlett, Narrative, II, 233.

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Pi on the Gila, with its low gradient and adjacent plains, were
Pa ordinarily mild and not devastating, there was little or no
241 difficulty involved in the relocation of fields.

Size of Cultivated Plots

It is certain that the average amount of land cultivated per person among the Pima and Papago is now considerably higher than formerly. Advent of the whites and introduction of the motive for growing a surplus for profit greatly stimulated development of additional acreages; aboriginal farming was purely for subsistence. Also, with Spanish contact the Pimans secured farm animals and this called for the cultivation of appreciably increased crops, made possible chiefly by the availability of improved Spanish implements as well as new and different crops, especially wheat and barley. Work for wages, with its concomitant extensive trade at stores by cash and barter, has so greatly distorted the original economic picture that it is now very difficult to reconstruct the ancient situation regarding land utilization; this applies particularly to the Pima. Knowledge of our informants in this respect was quite fragmentary.

Anciently, each Pima family had its own plot of ground and planted all the crops it could take care of, for then as now these Indians had a surplus of agricultural land above subsistence needs. Its size bore no close relation to size of the family but depended rather upon the amount of land immediately available, the man's industry in farming and whether or not he hunted much game. In early historic times the average cultivated acreage for the Pima family was two to five acres; for the Papago family, one-fourth to two acres (for a detailed discussion of this subject see Chapter III).

Division of Labor

Pi The sharp division of labor between male and female
Pa among the Papago kept the two sexes in separate groups dur-
462 ing daylight hours. Season and age also entered into the

5: Castetter & Bell N-5 (1938-1940 1942
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CHAPTER VI

AGRICULTURAL IMPLEMENTS

Pi Pa 241 Piman agricultural tools were few and simple, and fortunately it is still possible to find informants who carried on agriculture entirely with these primitive implements in their early manhood, thus it has not been difficult to secure accurate descriptions.

Pi Pa [324] The most important of these aboriginal tools was the digging or planting stick. It was preferably of the heartwood of ironwood *(Olneya tesota)*, but might be of mesquite, screwbean or southwestern jujube *(Zizyphus lycioides)*, depending somewhat upon what hardwoods were readily available. The aboriginal type usually was made from the branch of a large tree, but might be from a shrub. The bark was first peeled off, then at the digging end all the sapwood was removed on two sides to produce the chisel-like edge, while at the handle only sufficient of the sapwood was removed to make it convenient for grasping with the hand. The finished tool was about four feet long depending somewhat upon the height of the man who used it. It tapered slightly from the handle, about one and one-half inches in diameter, to about two and one-half inches at the digging end which was sharpened to a somewhat flared wedge or chisel-like edge, with slightly rounded corners; these soon became more rounded by use (fig. 12). It was thus fashioned by rubbing with a rough stone, and the edge was never fire-shaped or fire-hardened since the wood selected was itself very hard. There was no foot rest on their planting sticks, nor did these tribes ever have one forked like a crutch.

This implement is very similar, except in length, to those found by Hough[1] in Tularosa Cave, on the Tularosa River,

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[1] Hough, *Culture of the Ancient Pueblos of the Upper Gila River Region*, pp. 62-3.

5: Castetter & Bell N-5 (1938-1940) 1942

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a tributary of the San Francisco, which in turn flows into the upper Gila River.

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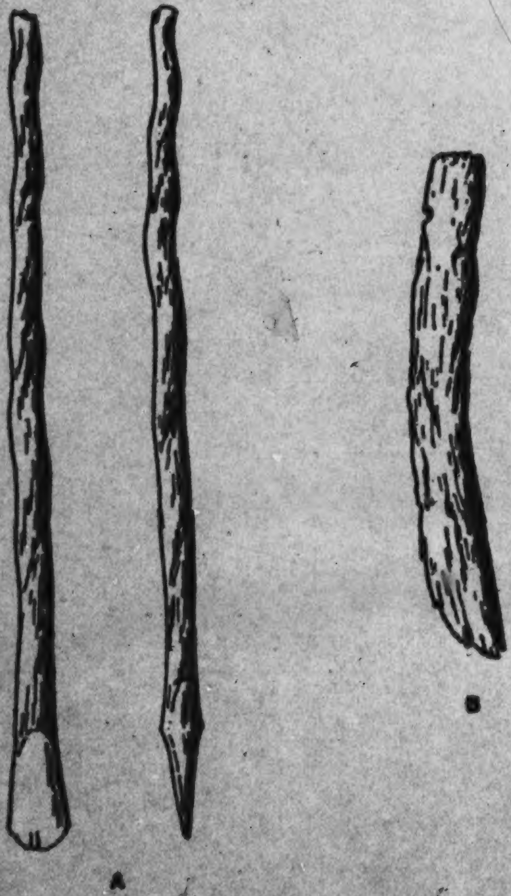

Fig. 1. Piman agricultural implements: (a) planting stick; (b) weeding hoe.

One Papago informant, Mattías Hendricks, maintained that, in his area, planting sticks used for wheat were made of paloverde *(Cercidium microphyllum)*, a rather soft wood,

5: Castetter & Bell N-5 (1938-1940 1942

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Pi and that these were about nine inches wide at the blade and
Pa four feet long. This was obviously a post-Spanish develop-
241 ment.

Another aboriginal farming tool was the weeding hoe, made of the heartwood of some hardwood tree, preferably ironwood but, on occasion, mesquite or screwbean. A specimen secured from José Petero, at Silnakya, was unearthed by him in the neighborhood of that village. This was a thin-bladed, hard, heavy, sabre-shaped structure—a somewhat curved slab of the heartwood of an ironwood tree, approximately thirty-three inches long, and about five-eighths of an inch thick. It gradually extended from a width of two and seven-eighths inches at the upper end to its maximum of three and one-half inches near the knife-like edge of the convex cutting end (fig. 1b). The fashioning evidently was done with a rough stone, and the implement showed no signs of having been fire-hardened or fire-shaped. Bone, horn or stone planting or hoeing implements were unknown to both Pima and Papago.

This weeding hoe combined the functions of spade and hoe and was used for cutting weeds off below the ground line, loosening soil around cultivated plants, in preparing irrigation ditches or in digging water holes. Its length was such as to preclude a man's using it except with a sidewise scraping motion while in a kneeling or sitting position.

Russell[2] found a single specimen among the Pima, and Papago Indians offered to sell to Lumholtz,[3] who explored southwestern Arizona in 1909-10, such an ironwood "hoe," reported to have been found in a mound in the Santa Rosa Valley. Later he secured additional specimens. He also found among the Papago a simpler form of the same implement, smaller in size and consisting of a flat, oblong piece of wood with edge sharpened in a similar way, which was said to have been used by the women. That the former type of

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[2] Russell, *Pima*, p. 97.

[3] Lumholtz, *New Trails*, pp. 68-9.

5: Castetter & Bell N-5 (1938-1940) 1942
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implement was used quite early is indicated by the fact that Fewkes[4] described and figured similar ironwood implements recovered in excavations at Casa Grande.

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Russell[5] described and figured a type of wooden shovel (made of either cottonwood or mesquite), which he regarded as aboriginal and as very probably making possible the digging of not only the Piman but the ancient Hohokam irrigation canals. All our information, obtained from Piman informants, is at variance with Russell's opinion. They maintained that their shovel, almost invariably made of cottonwood, was a post-Spanish implement; moreover this agrees with the ethnological and archaeological information for Southwestern tribes in general. Informants said that, anciently in digging irrigation ditches, the dirt was loosened with the planting stick and weeding hoe, then removed in baskets. The Pima shovel of historic times was a one-piece tool of heartwood, from a cottonwood tree, felled by burning, then shaped roughly by further burning, and finally by fashioning the heated blade with a rough stone. The first shovels were shaped much like a tennis racquet, the blade, about eight inches wide, following the natural curve of the tree trunk from which it came. That crude shovels were used at an early date in the Gila Basin, however, is indicated by Fewkes'[6] finds at Casa Grande; here he recovered flat, slate implements, sharp on one edge and blunt on the opposite, identified as shovels and hoes. One or more of them were shaped like spades, an extension on one side serving evidently for attachment of a handle; others were elongate, circular or semicircular. The handle on his figure 39, however, has evidently been attached purely for the purpose of illustration. Turney[7] also wrote of the ancient extensive use of stone hoes in the Gila Basin.

[4] Fewkes, *Casa Grande*, p. 148.
[5] Russell, *loc. cit.*
[6] Fewkes, *op. cit.*, pp. 131-32, pls. 70, 71, fig. 39.
[7] Turney, *The Land of the Stone Hoe.*

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Pi Pa 241 Another early post-contact Piman implement was the dibble, obtained from across the border. It might be described as the digging stick equipped with an iron blade, intermediate between the ancient planting stick and the modern long-handled steel shovel. The reader is referred to Russell's figure 10d.

Still another implement introduced among the Pima after the coming of the Spaniards was the rake. This was a primitive wooden tool about three and one-half feet long, made of a three-forked mesquite branch. The tines were strengthened by a cross-piece, then heated over a fire and their ends bent downward by fastening in the crotch of a tree, after which they were cut to a suitable length. When the rake had cooled, the cross-piece was removed. Sometimes a hay fork was made in similar manner, except that the tines were not bent and the cross-piece constituted a permanent part of the implement.

Of comparatively recent introduction into the Piman area is the wooden plow. The first Papago plow was made of a mesquite tree and its main root. This is shown in figure 2. Such plows were not common among the desert Papago as these Indians had little share in this early stage of cultivation by plow. They are extremely rare today. The plow was drawn by two rawhide strips passing back from the animal and fastened to a mesquite pin inserted through a slot in the share. The earliest Pima plow was fashioned a little more elaborately. The plow itself, consisting of share and single handle, was a piece of mesquite or ironwood to which was attached a cottonwood tongue fastened to the ox yoke; this in turn was tied to the horns of the oxen by leather thongs. The base and single handle were of one piece of wood, the latter being a branch of the tree trunk from which the base of the plow was fashioned, the share being about three by three by twenty-four inches and sharpened on the lower side. The lower side of the proximal end of the tongue was beveled to an edge, which fitted into a transverse notch at the base of the

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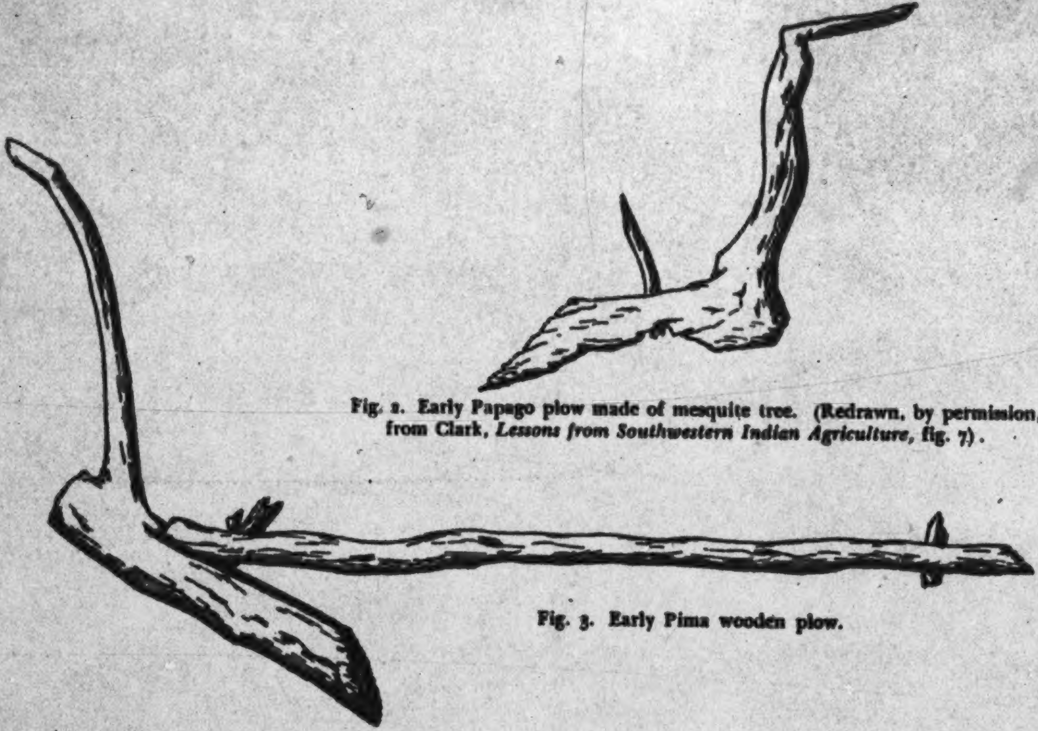

Fig. 2. Early Papago plow made of mesquite tree. (Redrawn, by permission, from Clark, *Lessons from Southwestern Indian Agriculture*, fig. 7).

Fig. 3. Early Pima wooden plow.

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Pi' handle, then the tongue was attached to the share by a mes-
Pa quite pin passing through both and kept tight by two wooden
241 wedges. On some plows a sheet of iron or steel faced the cutting surface of the share. The plow base was oriented at a rather sharp angle, approximately fifty degrees, allowing just the point to come in contact with the soil, thus permitting only very shallow plowing, a condition necessitated by the limited strength of the plow itself. Such a Pima plow was described in 1893 by Whittemore[8] and later figured by Russell.[9] (See fig. 3.)

[8] Whittemore, in *Among the Pimas*, pp. 87-8.

[9] Russell, *op. cit.*, fig. 11.

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Pi relation of the sun to the gap of the Sierra Estrella, the chief
Pa purpose being to determine the latest period at which it was
821 possible to plant crops and have them mature before frost.
805 Chico Bailey said his grandfather relied upon the position of the rising sun with reference to a certain point on Baboquivari Mountain to determine when it was too late to plant; also that the Papagos at Pisinemo used a similar spot in the Ajo Mountains for the same purpose.

Pi Tribal Papago traditions were passed on by word of
Pa mouth from official narrators to the youths. While these tales
538 might be told at any time upon request, particularly in winter
211 months, the creation myth was always formally and officially related during the sacred four-day solstice period. Pima and Papago annals, in reality records of important events, were kept on a stick variously notched or carved to designate special happenings.[7]

PLANTING

Time and Number of Plantings

Pi Wherever any group of Pimans anciently pursued agri-
Pa culture based upon irrigation from more or less permanently
241 running streams or springs, planting was begun as soon as
132 possible after danger of frost had passed, contingent upon an available supply of water at such time. But among all those Pimans who were dependent upon flood water from the washes the time of the single planting was governed entirely by the occurrence of summer rains, which usually began at any time from late June to mid-July. Aboriginally, groups having a rather constant supply of running water usually made two plantings, the first when danger of frost was past and the ground warm enough for seed germination, the second sometime after sahuaro harvest, depending upon the availability of water for irrigation, but rarely any later than mid-August because of danger from early frosts. Thus, in

[7] *Ibid.*, pp. 125-36; Underhill, *A Papago Calendar Record;* Russell, *op. cit.*, pp. 31-66.

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addition to being limited by water supply, the time of the Pi first planting was governed by late, the second by early, Pa frosts, these dates varying somewhat in different parts of the 241 132 Piman area. In this connection, Smith[8] tells us that a correlation of altitude and length of growing season, with corrections for latitude, shows that, on the average, an increase of forty-five feet in altitude decreases the average length of the growing season by one day, an increase of one thousand feet thus shortening the season about three weeks. At Sacaton, on the Gila River Reservation, with an elevation of 1,280 feet, a twenty-one-year record showed the average date of the last killing frost in spring as March 3, the latest known date April 22; the average date of first killing frost in autumn, November 15, the earliest date of killing frost, October 28. This gives the mean length of growing season as about 263 days.[9]

All Piman groups whose agriculture anciently depended Pi upon flood water from washes made but a single planting, Pa the time of which was in no way governed by a frost-free date 241 since planting had to await the beginning of summer rains, from late June to mid-July, and thus corresponding with the end of sahuaro harvest. Such was the general Papago situation, since with very few exceptions, notably San Marcelo de Sonoita and Quitobac, their agriculture was pursued without irrigation from running streams and was therefore styled *de temporal* or "thunderstorm." A number of reports of Indian agents at San Xavier in the closing years of the last, and beginning of the present, century refer to the "so-called second crop" of these Indians. By this was meant that the wheat and barley, planted any time from November to January, was designated as the first crop; the maize, beans and pumpkins planted after the first summer rains, the second. But anciently only a single crop was planted at San Xavier. Although this village had running springs, the Santa Cruz River, upon

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[8] Smith, *The Climate of Arizona*, pp. 380, 383.

[9] *Ibid.*; King, *Crop Tests at the Cooperative Testing Station*, p. 9.

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Pc Pc which these people also depended, was dry for a very large 241 part of the year, beginning to flow only with the onset of summer rains.

Pc 241 312 In addition to Pima planting seasons being governed by frost-free dates in spring and fall, they were limited as well by the availability of water in the Gila. Although the flow of this river at present is regulated by storage behind Coolidge Dam, the long-time monthly averages of the normal flow measured at a point above the Coolidge Dam are approximately as follows:[10]

January	50,000 acre-feet	July	24,000 acre-feet
February	52,000 " "	August	39,000 " "
March	56,000 " "	September	26,000 " "
April	36,000 " "	October	24,000 " "
May	12,000 " "	November	17,000 " "
June	3,000 " "	December	34,000 " "

To the above amounts should be added, as benefiting the area of the Gila River Reservation, the unregulated average flow from the San Pedro River of about seventy thousand acre-feet per year, most of which comes during July, August and September.

The Gila waters are thus seen to be highest at two periods, one during January to March, a second in August. However, this represents the mean taken over a number of years and it must be recognized that from year to year the monthly average fluctuated considerably. Only in flood season was the flow adequate to permit irrigation. It was not uncommon for the water in the Gila to fail completely, especially in winter but occasionally in summer as well. Russell[11] reports this happened about every fifth year, and is supported by comments of Anza, Eixarch, Font and others.[12] Such failure

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[10] L. J. Booher, Assistant Agricultural Engineer, University of Arizona, Personal correspondence, May 8, 1941.

[11] Russell, *op. cit.*, pp. 66-7.

[12] Bolton, *Anza*, III, 19, 353; IV, 45; *Report of the Commissioner of Indian Affairs* for 1871, p. 350; *ibid.* for 1875, p. 214; *ibid.* for 1878, pp. xxxix, 3.

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delay and very hot weather at time of maturity reduces the Pc
crop. Barley, however, is sometimes sowed as late as February. 241
Early plantings of winter barley and wheat at San Xavier and 221
on the Gila were, and are, infrequently damaged by late frosts coming the latter part of March and early in April. The best yields of Pima cotton have been obtained from plantings made before May 1.[17]

The agricultural picture for those Pimans (chiefly Pa- Pa
pago) who pursued *de temporal* farming follows: During 241
winter, families camped as near as possible to a permanent 221
source of water in the foothills and moved down to their fields only after the heavy rains had begun so as to be certain that drinking water would be available. It very rarely rained before sahuaro harvest, but if rains did come during this period they caused the ripe fruit to spoil on the trees. At the onset of rains the Papago stopped gathering the fruit and began planting. Also, if it rained during the sahuaro harvest drinking ceremony this ritual was terminated, as its purpose had been accomplished.

The season in Papaguería was concentrated in July and August, when almost all of the meagre annual rainfall occurred. Sporadic showers began toward the end of June, and by mid-July there were heavy thunderstorms if the season were good. It was immediately after the ground had been moistened by these rains that the Papagos did their *de temporal* planting, which was thus governed by the rains rather than season or temperature. As these rains might be local, some variation occurred in the planting season in different areas. Both Papago and Pima maintained that in early days there was always more rainfall than in recent years, the main reasons being that "the earth was younger and had greater powers and the Indians more carefully observed the rituals in those days."

July was known as the "Month of Rains," and August as the "Month of Short Planting." Plantings could be made up

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[17] King, Beckett and Parker, *Agricultural Investigations*, p. 24.

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221 to the middle of the latter period and still mature, but if the
241 heavy rains were delayed beyond this the Papagos sometimes did not plant at all since the growing season would be too short before frost. The latest safe date for sowing maize is now regarded as about August 17; for teparies, August 20-25. Under especially favorable moisture conditions two sowings of teparies might be made, the early one after the first summer rains, the second as "short planting" in mid-August. At present this late planting period is regarded as much more desirable for common pink beans and limas, since they go mostly to stems and leaves if planted early. If no planting were done, this changed their whole plan of life. Sometimes they ate their seed corn and beans, and spent the rest of the summer food gathering; then in winter worked for the Pimas in Sonora or on the Gila, earning their food and seeds for the next year. Due to the erratic rainfall, a crop often had to be reseeded, and even then there might be no harvest. In 1927 the tepary crop had to be planted three times on some parts of the reservation.

After the first heavy rains all Papagos hastened to plant their crops in order to get them up before the soil again became dry, always beginning with maize. Ordinarily only one planting of each crop was made, but, in the event of another period of rainfall within two or three weeks, a second planting might be made if land were available.

These Indians rarely planted anything before the rains started; a few individuals might plant small patches of corn, never any other crop, in the hope that the rains would soon begin and thus give them an early source of food. This could not be risked on any large scale, however, both on account of the uncertainty of the rainy season and the possibility of floods washing out the planting.

Since the fairly widespread cultivation of wheat within the past few generations, the Papago have modified their program to the extent of sowing wheat any time from late November to February, depending upon the rains, although

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they much preferred to have it in by the first of January. If sowed late the plants were short and the grains small, due to the effect of high temperature, or plants might be damaged by late frosts at the time of heading. In no case did they make more than one planting. Otherwise they continue to pursue their "thunderstorm" planting as they have always done, living at the *temporales* during the summer months only.

Method of Planting

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In the main, Pima pursued irrigated agriculture and customarily did their planting after first heavily irrigating the land and allowing it to dry out for about a week. Unless water from the Gila were available, it often happened that this one irrigation constituted all the moisture that crops received. Papago farming however was of the flood-water type, the seed being planted in moist ground at the mouth of a wash after it had been flooded by the first summer rains. The washes, usually dry for the rest of the year, were at that time filled for several hours with a torrent of muddy water which sometimes covered the flood plain to a depth of two or three inches. Here they put in their crops, knowing that even with very low rainfall a crop would mature if the rains were not too long delayed and surface run-off or sub-surface flow favorable.

Pima-Papago sowing aboriginally was done entirely with the planting stick; this continued well into modern times and several of our old informants, both Papago and Pima, have had considerable personal experience in its use. In this connection Díaz, writing in 1774 of the extensive cultivation of wheat, maize etc. by the Pimas, noted that all their fields were cultivated "with no more oxen and no more implements than a wooden stick, with which they make holes in the ground and go slowly burying the seed."[18] Informants invariably regarded ancient farming with the planting stick as superior to modern methods.

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[18] Bolton, *Anza*, II, 304.

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Planting among both peoples was a family enterprise done chiefly by the man, assisted by the older children; the wife might help if she were not otherwise engaged. Often this was handled reciprocally, families helping each other, a practice rarely followed today. Díaz[10] stated that the Pima planted in common. He doubtless meant that fields were worked in common under a coöperative plan, not that fields were communally owned.

[516] Aboriginally all crops were planted in hills, never in rows or broadcast. The planter stood in a somewhat stooped position to make holes for the seeds, thrusting the stick forcefully into the moist earth one or more times, depending upon the condition of the ground, and each time pried and jiggled with the stick to loosen the dirt. The surface soil at each hill was never scraped off before digging the hole, as was done regularly by some tribes. Hills were about six inches in diameter and into the center of each he next thrust the stick perpendicularly, turning it in a wide circle to provide a hole for inserting seed. Holes for maize were four to six inches deep regardless of the type of soil, and this same depth was used for several crops. There was no deliberate attempt to loosen soil in the hill to a depth greater than necessary for planting the seeds. When planting corn, the planter, if right handed, next took one step with his left foot and made another hill just like the first at the end of his foot, making the hills about thirty inches apart. After thus digging a number of holes the planter stopped to put in the seeds, which he carried in a leather or woven cloth sack tied around the waist, meanwhile carrying the planting stick in the other hand. Some individuals dug and planted one hole at a time. In any case only a few holes were dug at a time as they dried out quickly. When two persons worked together, one dug the hills, the other dropped and covered the seeds. The planter stooped to about a foot from the ground to drop the seed, making no effort to arrange them in the hole, and im-

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[10] *Ibid.*

mediately covered the seeds by scraping dirt over the hole with his foot. The surface was left flush with the ground, the soil not pressed down. Informants stated that, using the digging stick, a man could plant about a half acre of corn or teparies per day.

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There was no device for making certain the hills would be in straight rows, as one learned by experience how to gauge this with the eye. When tree stumps were encountered no special effort was made to keep rows straight and the hills were staggered around them. All crops were planted with the hills in adjacent rows alternating, and in no case was the soil between the hills worked at planting time. Since no attempt was made to locate hills in the same spots year after year, this was conducive to maintaining soil fertility.

Maize was planted four to six inches deep; teparies, kidney beans, lima beans, pumpkins, gourds, black-eyed beans, chick peas, watermelons, muskmelons and cotton about three inches, since, unlike corn and pumpkins, they could not push up from a greater depth of soil; lentils were planted about one to one and one-half inches and chili merely pressed into the soil, while tobacco was blown from the hand and the surface soil then scratched with a branch. Two informants said for watermelons, pumpkins and muskmelons holes were made about six inches deep, the seed covered shallowly, leaving a depression, and the hole gradually filled in as the plants grew.

Hills and rows for the last three were located six to eight feet apart; teparies, kidney beans, black-eyed beans, chick peas and cotton, one and one-half to two feet; lima beans about three feet, and lentils about twelve inches. Maize rows were thirty inches apart; teparies, kidney beans, black-eyed beans and cotton about two feet.

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The Piman ritual number was four, and, theoretically, four seeds of any crop were to be planted to each hill; practically, this has long been ignored. Maize, teparies, kidney beans, black-eyed beans, lima beans, chick peas, cotton,

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Pi gourds, melons and pumpkins were planted three to five
Pa seeds per hill. These people knew by experience how many
241 seeds of each crop should be planted per hill, for if plants came up too thick they did not produce well.

Gourds were planted differently from other crops. Among the Pima, about four hills, each three feet in diameter, were located and prepared near an irrigation ditch and close to a tree or bush if possible so the plants could climb; otherwise a forked pole was placed in the hill for support. Four seeds were placed in each hill at a depth of two to three inches, and the hills walled to retain water. When water in the ditch was high, it was conducted to the hill and walled in; when low, the channel connecting the ditch and hill was left open, allowing water to move to the hill at will. It was woman's responsibility to cultivate and care for gourds, as they were rather looked upon as her pet crop and easy to grow. The Papago planted gourds around the base of a small mesquite tree and fenced them with mesquite poles or sahuaro ribs to keep out jackrabbits. The vines climbed on the tree and fence. Occasionally water was carried to them for they required lots of moisture. They grew quite slowly and were cultivated twice. Informants said the signs of a well-grown gourd plant were that it had a thick stem even when very young and had wide leaves. Gourds were not planted by everyone every year, but as need dictated.

Chili required more frequent irrigation than maize. Informants knew that, although it needed considerable moisture, it would die if the ground were continually wet. Hence it was not planted on flat ground but on the sides of borders[29] about eight inches apart. A pinch of seed was merely pushed shallowly into the soil with the thumb, then the plants thinned out as desired. At present, plants for setting out are usually purchased by the Pima at a greenhouse.

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[29] In irrigated areas the term border is used to designate a unit of land enclosed by a continuous ridge of earth erected to facilitate irrigation; also at times to designate the ridge itself.

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[facing p. 154]

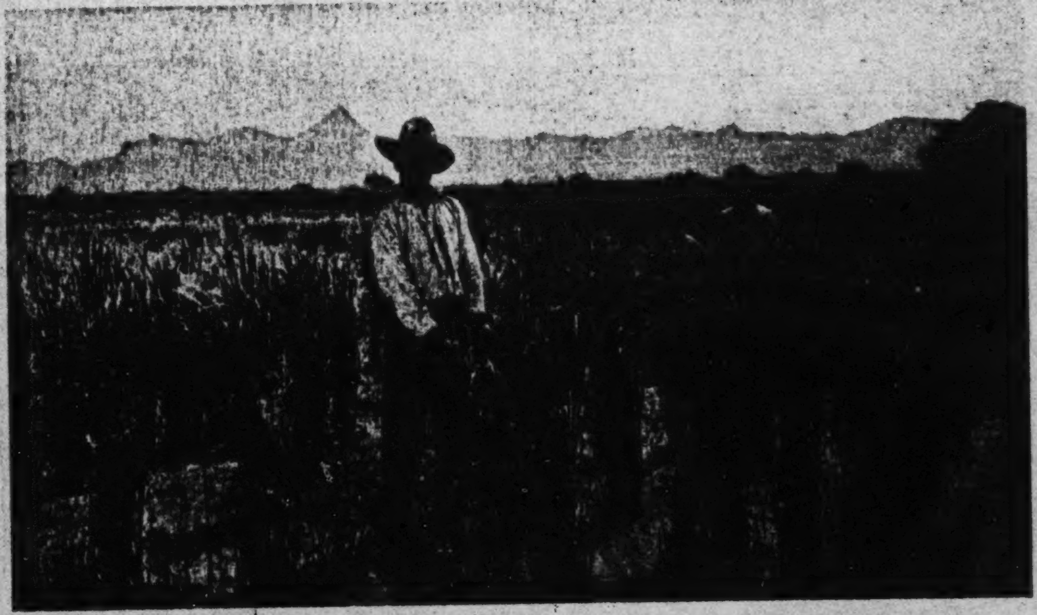

Fig. 4. Papago field of Baart wheat planted in hills and harvested by hand sickle June 2, 1928. Grown by flood-water farming near San Miguel. (Photograph furnished by C. J. King, U. S. Field Station, Sacaton, Ariz.)

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When the Pimans first used wheat it was planted in hills like maize as this was the only method they knew. Hills were dug with the planting stick about six inches apart, the rows spaced the same distance and manner as described for corn, and the ground between hills was not disturbed. One person dug the holes, another put in and covered the grains. Seed was planted two inches deep, about four or five grains per hill, and the soil in the hill left loose. Informants said such a planted field of wheat looked much as though it had been plowed. Later it was planted about fifteen inches apart in furrows made with a spatula-like wooden implement about four feet long and nine inches wide at the blade. Not until the introduction of the wooden plow was wheat broadcast, and when this was done some individuals mixed the seed with wood ashes and scattered the two together. However, some Papago, in flood-water farming, still plant wheat in hills (fig. 4).

Some soaked their seeds before planting. One cannot be certain, however, that this was an aboriginal practice. This was done particularly with flint corn and black-eyed beans, occasionally chili. The practice was resorted to especially when the first sowing did not come up, or was destroyed soon after germination by rabbits, floods etc. Some informants said when maize was soaked before planting its chief purpose was to wash off the corn odor so that the small ants which often ate young seedlings would not be attracted. Maize was known to germinate even though the soil was not very moist, but teparies, pumpkins and cotton required more moisture.

Pimans invariably planted the several crops separately in different plots and never mixed them either in the hill or plot, and any modification of this was a later development. Even brown and white teparies and the several varieties of pumpkins were planted in separate hills and plots, as were the different colors of maize in order to retain their purity.

There was no ritual planting by direction as among the Pueblo Indians.

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Neither did these people anciently rotate crops to conserve soil fertility. Today, however, it is known that crops such as small grains and sorghums soon deplete the land and result in reduced yields if grown on the same soil repeatedly, so for a number of decades the Pimans have planted crops of maize, beans, pumpkins, melons etc. on ground from which the wheat was harvested in May or June.

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CULTIVATION

Four being the Piman ritual number, it was supposed to take maize four days to germinate and all informants insisted maize, teparies, pumpkins, watermelons and black-eyed beans were up in four days, that pink beans and lentils required five to six, wheat ten days. If the surface of the ground caked, seedlings other than maize with its pointed shoot had some difficulty in breaking through, and in such cases they were usually assisted by removing or pulverizing the clumps of soil around them. One Papago informant said that in farming *everything had to be taken care of*, even to the extent of aiding plants to break through the ground if necessary. Another stated it was not the purpose of the Papago to let plants grow by themselves but that all cultivated plants have to be taken care of and be helped by human hands, and one can not take things for granted. Informants advised that there was no ritual for cultivation since there was nothing could be done in a field to secure good crops except cultivate, and that if this were not done, poor crops would result. Another perspective on Papago industry and outlook was given by Chico Bailey, who, upon being asked whether the Papago ever abandoned fields because of erosion, said the proper thing for the farmer in a dry-farming area to do is stay on his land, work it and not abandon it; that there was nothing to be gained by moving elsewhere.

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The soil was worked customarily at planting time and again when crops were cultivated, also a third time if condi-

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tions necessitated. A few late weeds in a crop, especially in a field of maize, were not considered injurious. All informants were very definite in their opinion that anciently weeds were much less abundant than at present; that the Pimans kept their fields more free of them then than now. This may well be true when we take into consideration the numerous weeds which have been introduced and the rank growths of Bermuda and Johnson grass in the Gila Valley.

The Piman conception of the necessity for cultivation was primarily to remove weeds which competed with the crops. Time for the first cultivation was closely related to the frequency of rains and irrigation, as these aided the growth of weeds. In some cases it might have to be done soon after the plants were up; in others, when rains were delayed, the growth of weeds was retarded, hence there was little need for it. In general, however, maize was fifteen to eighteen inches high when first cultivated. The second, and last, took place when plants were about four feet high—when the ears began to show well. Pumpkins were first cultivated when plants were about a foot high and again after they began to spread out, but this was discontinued after the vines had begun to run well. Teparies were usually about six inches tall at the first cultivation, and were beginning to vine out at the second. Wheat was cultivated only once since it attained much of its growth during the cool months when weeds did not thrive so well; this consisted of working the soil between hills and rows and pulling out the large weeds, both being done when the wheat was about six inches high. Chili was cultivated twice, first when about six inches high, then again when about a foot tall.

Cultivation or hoeing was always done anciently with the weeding hoe. The operator held the implement by both hands in a more or less horizontal position. A right-handed man held the left palm against the lower side of the handle, his fingers clasping the upper side; the right hand was clasped, palm downward, over the blade about a foot from its

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terminus. He crawled about on his knees, striking with quick, somewhat diagonal thrusts of the weeder made toward himself from left to right, thus loosening and turning up the weeds. The hills themselves were rather free of weeds since that soil had been worked at planting time. The same type of movements were made in loosening the soil, and all aboriginal crops were cultivated in this manner. These Indians liked to do their hoeing before the weeds reached a height of about six inches. The larger ones were pulled by hand or roots cut with the weeder below ground level to prevent the plants from sprouting again; the smaller ones were simply cut down in stride while working the ground. All soil between the hills was loosened or scratched to a depth of approximately one inch, even though it had no weeds at the time and regardless of the kind of crop (except wheat). This was done chiefly to discourage the subsequent growth of weeds, but as well to preserve moisture and keep the ground from cracking. Weeds were always allowed to remain on the ground. Informants said teparies would climb if they had support, and unless weeds were kept out there would be no crop. In hilling, the operator worked in a standing position, pushing the soil around each plant to a height of about eight inches for maize, a little less for teparies, kidney beans and pumpkins; the diameter of each worked hill was approximately twelve inches. Hilling was done during the first hoeing and did not constitute a separate job. However, when dirt in the hills began to dry after flooding and packed somewhat, it was customary to loosen the soil in each hill although the intervening ground was not hoed at this time. Informants said the reason for hilling was to keep soil from cracking, also it prevented dirt from drying out around the roots so quickly and aided in producing larger and better plants and crops. Maize was hilled higher than other crops to anchor it against wind and flood waters.

Like planting, cultivating was acknowledged as men's work although women might assist if they cared to; practi-

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Pi Pa 241 cally, it was a family enterprise and all able members of the family worked more or less together. A few families worked reciprocally in cultivating.

Thinning out of crops was never done; in fact, it was not necessary since the planter was always careful not to put more seeds in a hill than the number of plants desired, the ideal number per hill being three to five. It was well known that if plants were too thick in the hill they did not do well because of competition for food, water and space, and that corn, for example, under such conditions produced thin stalks with poor ears or none at all. Ends of pumpkin and melon vines were sometimes broken off to increase the production of fruits, but this was probably not an aboriginal practice.

Ceremonial copulation in the fields to increase their productivity was unknown.

CONTROL OF CROP PESTS

Pi Pa 242 Young plants were not protected from animals and wind by branches from shrubs or trees as was done by some tribes. Pieces of cloth were sometimes placed on sticks and set up in the fields to scare birds away, and crude scarecrows were also made, although it is doubtful that this practice was aboriginal.

Anciently, as now, the Pimans were bothered by various pests. Grasshoppers at times caused considerable damage and one Papago informant had distinct remembrance of two different occasions when the grasshoppers completely destroyed his grandfather's tepary crop. Little was done by way of control other than an attempt to drive them out of the fields with weeds of various kinds attached to arrowweed branches and set afire, thus making considerable smoke. After the Pima began to grow wheat, the stubble was sometimes burned in an attempt to rid the fields of pests. Locusts were reported in 1897[65] as having eaten almost all the crops that had been

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[65] *Report of the Commissioner of Indian Affairs for 1897*, p. 110.

5: Castetter & Bell N-5 (1938-1940) 1942

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CHAPTER VIII

HARVEST, STORAGE AND SEED SELECTION

TIME OF HARVEST

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The time to harvest a crop was never determined by the position of the sun, moon or constellations, but by the condition of the crop itself. In other words, each family harvested its crop when ripe, and there was no set common harvest date as among the Pueblos.

Anciently the Pima had two general planting seasons (see section on *Time and Number of Plantings* in Chapter VII). The first sowing, from late March to mid-April, was harvested in late June, just before the sahuaro harvest; the second, made in July immediately after sahuaro harvest, was ripe in October. This is confirmed by Russell's[1] observation. In this connection Emory,[2] writing under date of November 11, 1846, asserts that all Pima crops had already been gathered.

The Papago made a single planting, after the rains began, which was usually in July, although at times delayed until August, and these crops were ready for harvest in October or early November. Among both peoples, introduced wheat and barley were planted from November to February and harvested in May or early June, while the commercial growing of cotton and other crops has resulted in extending the Pima harvest season until mid-November or even later.

There was no established or fixed sequence in harvesting the several crops. Usually, maize, being the major crop, was harvested first, followed by teparies then pumpkins, since a little frost was not considered harmful to them. Teparies could not remain in the field too long, due to the danger of

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[1] Russell, *Pima*, p. 90.

[2] Emory, *Notes*, p. 85.

5: Castetter & Bell N-5 (1938-1940 1942
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injury from rain. Cotton and gourds were usually gathered after all other crops had been taken in, although if corn were late in ripening it might be harvested last.

Division of Labor

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Planting, cultivating and irrigating Piman crops were regarded as men's work, in which women played a minor role. Quite the reverse was true with harvest, for it was regarded as essentially women's responsibility and men did only the heaviest of the labor, but both might work together in the field. However, with the introduction of wheat culture, some modification occurred, for the harvesting of wheat fell largely to the men, although assisted by women. Harvesting anciently was often done reciprocally, several families within a geographic area helping each other. To invite relatives to assist with harvest was regarded as favoring them. For their labor they were asked to help themselves to a share of the produce, but what they took was governed by what they considered they could repay in turn. When widows assisted, they were given a portion of the crop in payment.

* * *

Maize

Gathering, Roasting, Drying and Storing

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The Papago planted a single crop of maize, which they harvested in October; the Pima grew two crops, the first maturing in late June, the second in October. In no case was there any difference in the types of corn grown at the two plantings, nor was there any difference in the purpose for which the two crops were used.

Corn was considered mature and ready to harvest when most of the stalks and husks were thoroughly dry. It was then time to begin even though some ears were still green. The variety of native corn that had been planted first would be ready to harvest first, regardless of color, for no one variety ripened more quickly than any other.

5: Castetter & Bell N-5 (1938-1940) 1942
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Pi Pa 241

Anciently the Piman method of harvesting maize was to pull up the entire plant, or, in some cases, break it off at the ground, and throw it in piles, care being taken to keep separate the several colors of corn, since they had been planted in different plots; this was man's work. One reason for pulling up and removing the stalks was to have the field cleared for the next season. After Spanish contact, plants were sometimes cut off at the ground with an iron implement. Another historic development associated with turning stock into the field to eat the stalks was to husk the corn directly off the standing plant, the stalk being allowed to remain. The individual first ran a sharpened, hard stick of creosote bush or mesquite through the husk, then broke the ear out and threw it on a pile. In any event, harvesting was begun at a convenient place in the field, and did not proceed by designated direction as among some of the Pueblos. There was no ceremonial restriction against burning the husks, cobs or stalks. Pi Pa Cobs were used as fuel, particularly in cooking, and some [342] stalks might be used in building the walls of a new structure. [372] Saving purple husks to be used as a source of dye was unknown.

The plants were piled in one or more heaps, depending upon the size of the field, and women and older children usually gathered around the piles to remove unhusked ears from the stalks and throw them in piles. These ears were then carried to the dwelling in burden baskets (figured by Densmore[8]) by the women.

Pi Pa 251 252

Although the Pimans husked some of their maize, particularly in selecting ears for seed, it was the common practice to partially roast their corn in unhusked ears by placing it in piles and covering with brush; this was set afire, green mesquite branches being used to stir and turn the ears, and, after several minutes of roasting, to throw them out on a bed of grass. During the roasting process much of the husk was burned away. These ears were dried on top of the house for

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[8] Densmore, *Papago Music*, pl. 10.

5: Castetter & Bell N-5 (1938-1940 1942

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Pi Pa 276 782 When smoking individually, a man might do so merely for pleasure or to communicate with the Great Spirit. Thus, while out walking somewhere, he might sit down to smoke and blow the smoke upward as a kind of unexpressed or incipient prayer, meanwhile talking to the tobacco or the smoke. But, in such cases, he must always finish the cigarette; that is, smoke it to a short stub, then roll it into a ball and gently place it on, or stick it into, the ground. A Papago, while smoking, must talk to the smoke which carried his prayer, else it would have no virtue. A man in trouble always smoked, and it was customary to do so before engaging in any endeavor, either personal or collective, for this was looked upon as a great help. It was done either to obtain aid for specific things or for the general welfare, such as planting, seeking rain, securing good crops, curing, health, preparing for warfare, sports etc. Pa [241] In planting or otherwise caring for his crops, a man, while smoking, blew smoke over the field, asking the Great Spirit that his crop grow well, that he have a good crop and that his relatives might benefit thereby. Pa [526] A man planning to run a race against someone from another village might blow smoke toward that village. In this case he would not talk to the Spirit but would say to his opponent, "You are not a great runner, I can beat you." Pa [821] He might also blow smoke toward the Apache when preparing to go to war against them, or toward the Gulf of Mexico when preparing for a salt expedition. One could talk to the Spirit without smoking, but smoking was thought to be an aid.

Pi 782 Pima informants said that to them everything was mysterious, and for this reason prayed to the darkness. At night a Pima would smoke and blow the smoke on his breast saying, "Kind darkness, give me good rest and good dreams and may nothing harm me." They also had great respect for the sun, well-nigh amounting to worship. In the morning the Pima would blow his smoke toward the sun saying, "Oh kind traveling sun, pity me. Give me the strength that whatever

5: Castetter & Bell N-5 (1938-1940 1942

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Chapter X

GENERAL CEREMONIAL ASPECTS OF PIMAN AGRICULTURE

Pi Pa 788 796 Ceremonialism was feebly developed among the Pimans as compared with the Pueblos. Underhill[1] has pointed out that the native line of division among the Papago is along a north and south line, the more advanced groups being to the east, and the more primitive ones to the west. Thus the Archie group retains many of the old ceremonies abandoned elsewhere, such as the important ceremony of the Vikita. Although the Pima formerly had as much or more ritualism than did the Papago, it is much better preserved and more easily and completely obtainable from the Papago.

Pi Pa 241 789 The Piman conception was that ritual was just as important as actual cultivation in producing a crop, and no crop could be expected without it, consequently there existed a variety of individual and collective magical practices associated with the various stages of cultivation.

There was no formal group planting ceremony, the planting ritual consisting largely of singing individual songs of invocation and praise, maize, teparies, pumpkins and tobacco being planted with an individual invocation, which centered around maize as the principal crop. Also, with the Papago, the chief in each village got the people together just before planting time and exhorted them, saying it was now about time to plant crops, and that they should plant and industriously care for them. The day before planting started people began singing planting songs and continued until their repertoire was exhausted. During the summer, various nights of group singing were held to encourage the growth of crops. The most common of the various magical

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[1] Underhill. *Papago*, pp. 60, 231-35.

5: Castetter & Bell N-5 (1938-1940) 1942
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practices in parts of the Papago territory, to insure a good Pi
yield of both wild and cultivated crops, was to make effigies Pa
of the desired fruits and plant them in the gathering grounds 241
after a night of ritual singing; or merely an ironwood stake 789
would be planted instead of an effigy. In general the Papago did not ask for things directly, but in their rituals made statements to the Great Spirit and assumed their needs would be taken care of.

In addition to individual or personal ritualism, the Pimans had certain group ceremonies. After the crops had been put away, inter-village rejoicing often took place, at which games and races were held; this was occasion for jollification, as food was plentiful. People from other villages who helped in the observance were given meals and, at times, such products as corn to take home as a reward for their services. This celebration was held reciprocally from year to year, but always at a village which had harvested a good crop.

A characteristic and important Papago ritual was the green corn ceremony, held when the plants were about three feet high and just before the grain began to set, usually in September. Men gathered ocotillo poles and sang songs over them, then went to the fields and stuck an ocotillo rod at the base of certain corn plants, as well as representatives of each of the several kinds of crops. The object was to invoke the plant to grow strong like ocotillo and bear fruit. This ceremony was a combination of solicitation for a good crop and thanksgiving for those already received.

A regular ritual, practiced by both Papago and Pima, was Pi
the rain ceremony held at the time of giant cactus harvest Pa
(see fig. 5). This celebrated the beginning of the Piman 241
New Year, and was the occasion when the fruit of sahuaro 789
was fermented to yield an alcoholic beverage, which was 535
drunk in quantity. This was performed specifically to bring rain, and, formerly, planting was never begun until after the first rain ceremony had been held. This was not because it

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Pa was taboo, but due to dryness of the soil. Any village which
241 found it convenient held the first ceremony and "caused the
789 rain," then other villages in succession held celebrations dur-
635 ing the summer to insure the continuation of rains. One
custom was to erect two poles outdoors, about fifteen feet
apart, and stretch a rope between them; on this shamans tied
eagle feathers, symbolical of clouds, and all danced around
these ceremonial objects.

Pi Pima informants spoke of a "rain calling" ceremony in
Pa which certain groups of people got together in the council
241
789 house for the purpose of bringing rain. Runners were sent
737 out into every part of the village to secure all available sotol
mats, then four posts were erected in a square and the mats arranged around these to form an enclosure, leaving an entrance at the east. Large baskets were placed upside down around the wall, inside the enclosure. Three shamans sat near the west wall, facing the east, with singers behind the baskets. Before each shaman was placed a large bowl containing eagle down, symbolic of clouds, and laid beside the bowls were tail feathers of an eagle. Using notched wooden rasping sticks, the musicians made a peculiar noise by drawing these over the baskets, and all joined in the singing. This was done four times. At certain stages each shaman took all the eagle down from the bowl in front of him, grasped it tightly in his left hand, rubbed it with his right hand and held it to the west, rubbed it again and held it toward the east, and so on in all directions. Then, changing the feathers to his right hand, he moved around in front of the baskets shaking the feathers toward the singers.

This ceremony was carried on during the entire night, and, at its close, the shamans revealed what they had "seen" during the night and prophesied how many days would elapse before it rained.

This is doubtless the "rain-calling" ceremony referred to

5: Castetter & Bell N-5 (1938-1940) 1942
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[p.225]

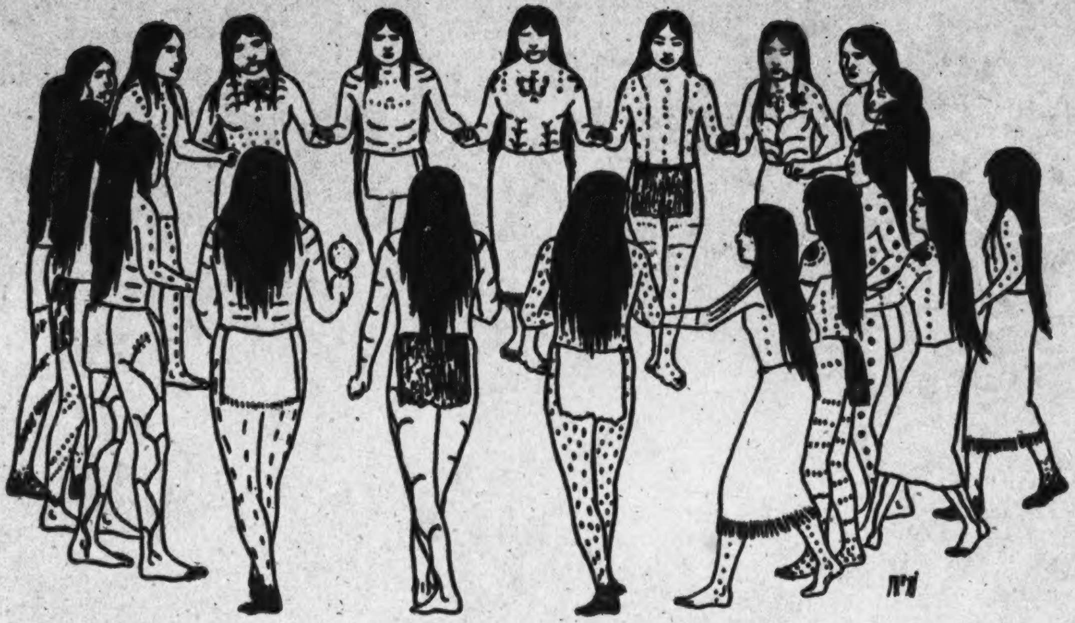

Fig. 5. Papago Rain Dance. (Reproduced from Underhill, *The Papago Indians of Arizona and their Relatives the Pima*, through the permission and courtesy of Dr. Willard W. Beatty, Director of Education, U. S. Office of Indian Affairs.)

5: Castetter & Bell N-5 (1938-1940) 1942
NU28 Papago NU28
Pima NU29

crops from disease and to insure good health and long life. Pi Pa 241 789 The paraphernalia used consisted of effigies representing clouds, corn, sahuaros, chollas, mesquite beans, deer etc., and were carried in a procession by masked singers. Every man in each village made some such effigy out of twigs and colored cotton, and this he carried to the scene of activity. Pi Pa 241 789 Painted prayer sticks, adorned with fine turkey or eagle 293 feathers, and the bull-roarer symbolized growing corn, lightning, thunder, clouds and the sound of rain. A group of clowns performed a variety of activities, such as carrying long poles to represent those with which sahuaro fruit is gathered, gourd rattles, portraying giant cactus trees, and wearing turkey feathers on their heads to symbolize the fruit. There were also representations of the sun and moon. They went through the motions of shooting at men disguised as deer, or at imaginary jackrabbits, antelope and other game. Pi Pa 241 789 A replica of a field was made by each village, and sand brought from the arroyo was placed nearby to portray the mouth of the arroyo close to the field. Clowns in proper costume investigated to see if these "fields" were in proper condition, and imitated people working in fields by cleaning the "ditches" and burning "weeds." Shamans sprinkled cornmeal on the breasts of everyone, thus preventing sickness and bringing them long life, and, according to Davis,[4] such meal was made only from branched or twin ears of corn. Representatives from each village sang their cycle of eight songs, repeating as often as necessary, for singing continued all night. Pi Pa [301] Just before dawn, the singers disrobed and painted themselves in a spotted fashion to depict multicolored ears of corn, principally blue, red and white. Girls carried ears of blue and white corn, and in each village group there were two men who represented yellow corn. Invariably the best specimens of corn, pumpkins and teparies were used in this ceremony. Content of the songs represented a description of the appearance of clouds, the occurrence of thunder, light-

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[4] *Ibid.*

5: Castetter & Bell N-5 (1938-1940 1942
NU28 Papago NU22
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ning, of rain and water running in the arroyos, of corn growing and fruiting. The purpose was to assist in producing a plentiful harvest and to give thanks for favors already bestowed.

Pima informants said that in earlier years their people had taken over from the Papago, in a half-hearted way, the ceremony of Vikita, but that it soon died out. However, in 1906, Brown[5] described a Pima-Maricopa harvest festival formerly held south of the village of Blackwater on the Gila, and, though known as a harvest festival, it might be performed on one or more important occasions each year. Here a group of musicians beat drums of carefully burned out cottonwood logs, a piece of half-tanned deerskin stretched across each end. Others drew bone rasps over the bottoms of upturned baskets, which had been spread with a layer of the gummy secretion of the mesquite tree. An unusual feature of this celebration was that the performers carried wooden and stone phalli, which were doubtless symbolic of fertility. Also, they carried long wands, evidently prayer sticks, tipped with feathers of wild turkey.

Pi [534]

Pi Pa [801] 821 822 171

Some ceremonial practices and beliefs similar to those found among the Pueblos were also to be observed among the Pimans. One of these was color-direction association. The Piman ceremonial number is four, and four directions are recognized, associated with ceremonial colors. As applied to maize, one Pima informant at Sweetwater volunteered the information that white corn is east; red corn, west; blue corn is north; yellow corn, south. In addition, variegated corn was said to represent "up," while "down" corn was nearly black. This informant was asked on a number of different occasions to repeat the relation between directions and colors of corn and the results were invariably the same; we found it impossible to confuse him. Although this color direction does not check exactly with that given by Parsons,[6] who has listed a

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[5] Brown, *A Pima-Maricopa Ceremony.*

[6] Parsons, *Notes on the Pima,* p. 459.

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number of comparisons between the Pima and the Pueblos, or by Underhill or Whiting,[7] the general situation has its counterpart among the Pueblo Indians. Pi Pa 221 222 171

Another Pueblo resemblance is seen in the assertion of some Pima informants that, if a man accidentally cut off a stalk of corn while hoeing, it was buried in the field, or tucked under his belt and carried home at night. He felt very badly about the experience for corn was his very life. It was just like "killing his own life," or injuring a friend. Papago had no such outlook. When a Papago cut off a stalk of corn he too felt badly, but this was due purely to economic considerations. However, one informant said that, if the hoes of two persons struck together while hoeing, it was an omen that enemies were coming, so the workers quit and prepared for them. This, too, has its Pueblo counterpart. Still another Pueblo resemblance is seen in the statement of one Pima informant that planting was always started in the east of the field and proceeded toward the west. Pi Pa 171 241

It is customary among the Pueblos for the people of a village to prepare, plant, hoe, irrigate and harvest the cacique's field, which in reality is a community field. Among the Pimans, it was not uncommon for the people in a village to take care of the chief's or headman's field, although this was never out of ritualistic considerations as among the Pueblos, but for purely practical reasons. Their view was that if the chief were too busily engaged with tribal matters to look after his farming it was only fair for his people to assist. It was in no sense compulsory.

Pimans, particularly younger women, carefully avoided branched or twin ears of corn, but these were commonly used to provide cornmeal for ceremonies. Informants said that women refrained from eating such ears because they feared having twins, which were regarded as an ill omen. Pi Pa 784 787 845

There was no ceremonial sexual restriction at harvest or

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[7] Underhill, *op. cit.*, p. 124; Whiting, *Ethnobotany of the Hopi*, p. 45.

5: Castetter & Bell N-5 (1938-1940 1942

NU28 Papago NU28
Pima NU29

Pi Pa 171 any other period in the cultivation of crops, nor was there ceremonial copulation in the fields to increase fertility.

241 A magical practice common to Pima and Papago was performed for the purpose of increasing the productivity of crops, particularly pumpkins, watermelons and muskmelons. When these plants began to flower their owner sought a set of female twins whom he took into the fields. Each twin gathered tips of four pumpkins or melon vines, and walked through the patch chewing them and blowing her breath over the plants. The twins advised the owner to stay out of the field four or five days, then come back and he would see that numerous pumpkins and melons had set.

missions furnished the troops with horses. In the Papagueria 797 proper there were well-to-do missions such as Caborca, but the nature of most of that country would indicate that they were generally on a modest scale. There was one in Sonoita and two on the Gila River. In 1751–3 there was a revolt in Pimeria Alta, and in 1840 the Papagoes again revolted against the government.

With the expulsion of the Jesuits in 1767, and later of the Franciscans in 1828, the missions as well as the forts decayed and vanished. Changing political conditions in Mexico also contributed toward their disappearance. To-day the former missions interest few and are left to the archæologist to trace. Such has been the fate also of the missions among the Yaqui, Opata, and Seri Indians.

As for the Papago, the greater part of the tribe never 361 could be induced to live in pueblos, or villages, which was 221 always the policy of the Spanish missionary. In spite of the efforts of the Jesuits and Franciscans, the Papagoes are still living in their *rancherias* as of old, half nomadic in habit, resorting in the winter to the sierras where water is more plentiful and where their cattle, horses, mules, and donkeys find good grazing ground. In the 361 summer they move to the broad, flat valleys to devote 241 themselves to agriculture which is made possible by the aid of the showers that fall in July and August. They [312] do not usually pursue irrigation beyond the diverting of rain water into ditches. In the summer they raise maize, beans, watermelons, and squashes, and in the winter when infrequent light showers usually may be depended

361 241 upon, peas, barley, and lentils may be planted, all on a small scale, according to Indian habits. Wheat, which is grown in November and harvested in May, is now the most important crop.

361 312 By scooping up the earth they make dams in which rain-water is stored for household use as well as for their domestic animals. This is especially the case at the summer rancherias. Of late years they have also taken to the digging of wells, going sometimes as deep as seventy feet, but they have been known to find an abundance of water at a depth of only eighteen feet. Thus the Papagoes, though sedentary Indians, have distinct habitations for summer and winter. The aboriginal name for the summer rancherias is *oóitak*, fields, called by the Mexicans *temporales*. The winter rancherias are called *kíbim*, where there are houses (*ki*), and these might be called villages. In some cases the summer rancherias seem to be considered the more important habitations, and medicine lodges are found at both.

721 As implacable enemies of the Apaches, the Papagoes were of some assistance to the early missionaries in helping the presidios to fight their savage foes, and they have several times, says J. F. Velasco, presented the government with ears and scalps of Apaches they had killed. Their innate enmity to the Apaches later gained them the favor of the Americans, who received their valuable assistance in campaigns against these marauders. They also gained the good-will of the Mexican Government by assisting in the war against the valiant Yaqui Indians.

600 It has been the good fortune of the Papagoes to live

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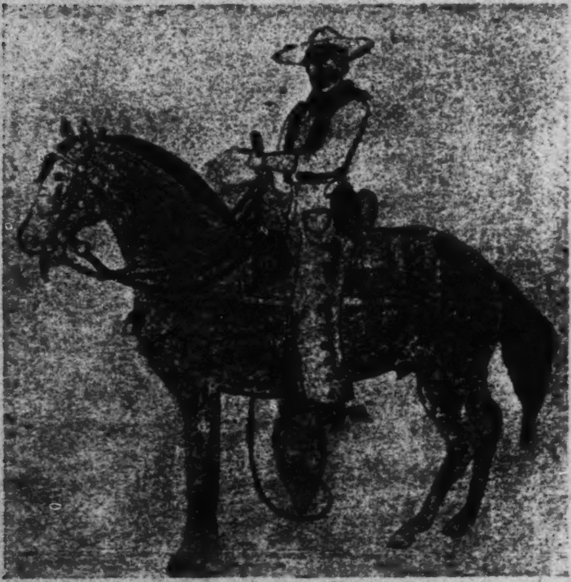

Picture drawn by an untutored Papago

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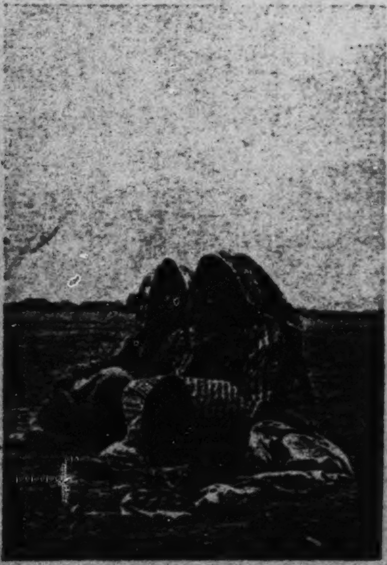
Using the ancient hoe



Mother with child in cradle. Akjin

[Facing p. 62]

124 him then, but during the following three days he worked
532 at the drawing from memory in his spare time, being
mostly occupied in his field and with his cattle. After
long deliberation, he finally consented to part with the
picture which is shown on plate. The horse is painted
with red ochre and the necktie is blue, the color having
been bought in an American store. The artist was
about fifty years old.

244 Following a fairly good wagon road eastward through
312 the Comobabi Mountains, I first halted at a rancheria
called "Badger's Well," where I found all the old people
absent in the sahuaro fields. The younger generation,
inclined toward the white man's ways, offered little of
interest. They spent much of their time in laughter
and animated talk at the well, where they watered their
cattle and horses. I noticed a quail creeping stealthily
to drink from the overflow of the water, a few yards
from the well. Its thirst was quickly satisfied, when it
retired to safety among the bushes.

492 A man sold me a spur made from the cleft of a mez-
quite bush. It has a very sharp point, which is most
efficient, though cruel. Only one foot is thus provided.
316 A negro came along, a rather strange appearance in this
part of the country; he told of a silver mine four miles
east of there that he and half a dozen of his race owned.
It had been found by one of them who had been a
prospector for eight years.

764 There were many ants in my camp, so I was glad to
pack up in the morning. A visit was first made to the
burial place, which was of the usual unattractive de-

132 air currents changed and became dry. In the evening the temperature felt just right, about 85° F., and the air, at an elevation of four thousand feet, had the superb quality of the desert.

000 I had selected my camp a couple of hundred yards from the house, on a sandy, level ground among small mezquite trees and choyas. The sandy surface was as clean as if man had never walked over it; the Indians on their way to and from the distant well at the foot of the mountains all followed the same track, and there were no waste paper and tin cans strewn about to impair the full enjoyment of nature, as would have been the case near civilized man's abodes.

The attractive camp, the nice family we had met, the addition to my collections, the peace and quiet of the place made me feel happy as I stretched myself on my cot under the starlit sky, which seemed so blue and cool and near. A soft breeze from the west fanned me to sleep, while a mocking-bird kept on singing its most delightful notes in the dark night. Ye dwellers in cities know not what it is to feel your freedom!

Next morning, shortly after sunrise, I strolled over to the house to see what my Indian friends were doing.
285 The mother was busy at work repairing the burden basket she had sold me. She was just finishing a new band for the back, which is plaited in the same manner as the sleeping mat and from the same material. Some Indi-
241 ans rode up offering for sale a most interesting wooden object that resembled a broadsword, and which may be termed a hoe, made of the heavy iron-wood and accord-

ingly very strong. This implement, which is called *kiik*, 241 the same word as that for plough, had, according to my informants, been found in a mound in Santa Rosa valley. It is extremely rare, though I later succeeded in securing, mainly in the rancherias of Santa Rosa and Ánekam, ten specimens more which were kept in the houses of the Indians. It is not quite appropriate to call this implement a hoe, as it was employed solely for the purpose of weeding. Although I did not see it in active use, people in that section of the country know it very well. Probably it is occasionally still resorted to. The showers, which in that hot climate make plants grow very fast, bring forth in luxuriance weeds that, unless twice removed, would choke the crops. For the more recent innovation of wheat agriculture during the winter, one weeding is sufficient.

When in use the wooden hoe is held by both hands in a more or less horizontal position, the left hand around the handle, the right on the blade, while the bearer crawls on his knees and cuts in between the weeds, loosening the roots and turning them up. I found a simpler form of the same implement, smaller in size and consisting of a flat, oblong piece of wood with edge sharpened in a similar way, which was said to have been for the use of women.

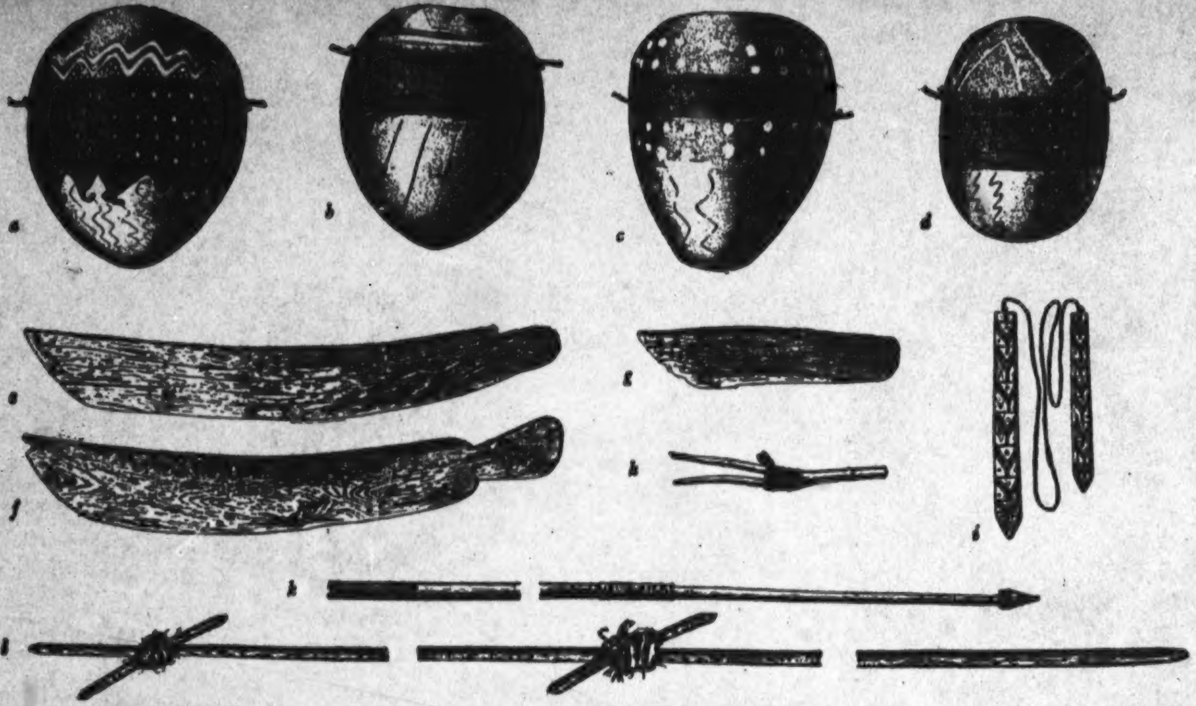
On returning with milk which he had bought from 312 the friendly family, Pablo told me that Marianita, the young girl, had gone to the well for water, a mile away, and that I might have a chance to take a snapshot of her when she returned. After a while she appeared at a ooo

later with welcome black clouds which poured down 132
considerable rain. The storm passed from Indian Oasis
over Tucson, where, as I later learned, it damaged the
roof of the new hotel. Some more rain the following 600
evening and night made the outlook bright for continued
travel. We were soon on the road again westward bound
for Chief Alvina's sahuaro camp. After the somewhat
vague indication as to its location being near the southern
part of the Quijotoa Range, we had been left to our own
instincts of orientation to find it.

On arriving at the so-called "Pump-house," near the 241
Quijotoa Range, I made a détour of thirteen miles southward to the great summer rancheria Kuôitak (Big Field), in order to make sure that the recent showers had not already induced the chief to leave his sahuaro harvest for agricultural pursuits. It was surprising to find such a large cultivated area in the wilderness. It was over two miles long, from east to west, and a half mile wide, consisting, of course, of many small adjoining farms, all fenced in by loosely made mezquite fences. The late showers had certainly been effectual in bringing about changes. Pools of water enlivened the landscape here and there, and even some grass had begun to appear, scarcely forty-eight hours after the rain. Birds were singing in a lively manner, and there was spring in the air, but evidently the Indians did not consider the rain of sufficient quantity to justify them in beginning their ploughing. In July or August, as soon as they are assured of the soil being well soaked, they immediately
repair to their summer rancherias. So far, only one 000

7: Lumholtz N-5 (1909-1910) 1912
NU28 Papago NU28

[Facing p. 96]



PAPAGO ETHNOLOGY

a (Santa Rosa, height, 19 ctm.); *b* (Kvívo); *c* (Ânekam); *d* (Âktjin): Singer's masks. On the red (upper) section the zigzags mean clouds, on the white (lower) section the zigzags mean clouds and lightning; dots symbolize grains of corn. *e*, length, 77 ctm.; *f*, length, 76 ctm.; *g*, length, 41 ctm.: Ancient wooden hoes from Ânekam, used by women. *h*, twig of greasewood, used for scratching oneself when on salt expeditions; length, 18.7 ctm. *i*, bull-roarer; the triangles symbolize clouds; the lines (red) descending between the triangles indicate lightning, and the dots are corn, length of longest, 50.7 ctm. *k*, old Papago arrow, with obsidian point, from cave in Baboquivari range, total length, 1 metre. *l*, stick for bringing down sahuaro fruit; total length, 4 metres.

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000 for agricultural interests, and the small stream which as a quiet brook passes back of the church represents the last of the Altar River, soon to disappear into the sand.

In this church it was that the population took refuge in 1857 to defend itself against the American filibusters under the command of Captain H. A. Crabbe who invaded the pueblo. The presidente of Caborca accompanied me up into the tower to show me the marks of the enemy's bullets. The Americans had entrenched themselves in a private dwelling opposite, maintaining probably a well-directed rifle fire. A Papago Indian saved the day for the Mexicans by ingeniously attaching fire to an arrow which he shot from the tower onto the straw roof of the American fortress, thereby succeeding in igniting it, which forced its surrender. The Americans were all shot, for times were rough in those frontier days.

648 The Papago Indians of Caborca number eight families who live in the suburbs, most of them making their living by working for the Mexicans. Two families still
222 possess nice, large fields where both maize and wheat
●241 are raised and where splendid specimens of the wild fig trees (Spanish, *biguera*) were conspicuous; this fruit is gathered twice a year and eaten fresh or dried. Other
222 fruit trees here were granadas and peach trees, as well as
136 the ever-present nopal cactus, which is so useful to the natives, both stems and fruit being relished. There are great numbers of the giant cactus growing between here and the coast, but the fruit has not been gathered for
000 several years. It appears that a feast at which sahuaro

609 sion, the Indians taking us to be *celadores* or mounted inspectors from the Sasabe custom-house, who at uncertain and mostly long intervals make tours along the border line. There are two hundred miles from Sasabe to the Colorado River, but the inspectors seldom or never go beyond Sonoita. The Indians seemed relieved at being correctly informed and were kind and gentle. [191] They no doubt understand Spanish, but if spoken to would answer only in Papago. Two kinds of small [136] wading birds were noticed at the dam and in the morning up to noon the coyotes would fearlessly come to drink. Some Mexican cowboys passing by lassoed one and then let it go again.

● 241 On the day of our departure we passed one of the fine fields which the Papagoes have here. The maize had been stored away, but two huge heaps of squashes were piled on the field; near one of them sat two women, cutting them up into long ribbons. When nearly dry these are folded up in convenient bundles and kept for winter use. There was only one small jacal in the middle of this field of plenty, and thither I directed my steps to buy some watermelons. Here also was a woman mak- 241 ing squash ribbons, great numbers of which were hang- 251 ing, festoon-like, to dry from the branches of a tree outside.

261 476 All these women came from other parts of the country and were preparing to take away as much as they wished in accordance with the ancient custom which prevails at harvest time of those who have sharing with those who are less fortunate. If a Papago is known to have been

Sand Papago

184 seventy years ago—because the old men who had charge
796 of the ceremonial objects of the feast had died, and it was decided that the latter should be taken care of at Quitovac.

184 These sand people were intelligent, healthy, and able-
221 bodied, and managed to make a good living in an abso-
[147] lute desert. Their existence depended upon the knowl-
224 edge of the few places in the mountain ranges, not even
[312] one in each range, where rain fills the tinajas, as well as of the few places along the coast where water can be found by digging for it. Once where to look for water is known, the difficulties in making a living out there are not so great as one would expect. In hot weather they followed jack-rabbits in the loose sand until the latter were exhausted, and caught muskrats by burning the accumulations of cactus spines with which those animals keep enemies away from their burrows. They also killed mountain-sheep, which were not a difficult quarry, with their bows and arrows, especially in the large craters, and they were even able to approach mule-deer and antelope near enough to kill them by the same weapon. Lizards were eaten. At certain seasons they went to the coast for the fishing, catching as many fish as they wished.

184 A single agricultural site may be attributed to the
● 241 sand people, called Súvuk, south-east of Tinajas de Emilia, in Pinacate. Maize, squashes, and beans were planted here by means of a stick, on a very small scale, but the majority of these people had no agriculture what-
184 ever. They found good edible plant food in the dunes,
222 especially *ammobroma sonoræ*, the wonderful camotes

175 It was the Sobaipuris for whom and by whom the Spanish missions were built. The picturesque and well preserved San Xavier Mission, about nine miles south of Tucson, was built at the largest village, Bac. The others were located at Guvavi, about nine miles north of Nogales, and at Tumacacori, midway between.

Fleeing before the ravaging Apache early in the nineteenth century, the Sabaipuris abandoned their villages and the missions, and took refuge among the Papago, with whom the tribe merged and lost its identity. The last one of the known Sobaipuri braves died in Tucson in March, 1932.[2] The present village at San Xavier was settled by Papago at a later date.

ECONOMIC ADJUSTMENTS TO THE LAND

132 312 Water, or rather its absence, is the critical factor or resource of the Papagueria; limiting in turn habitable sites where water may be had for domestic purposes; limiting the economically useful vegetation to short lived annuals and low scattered xerophytic perenniels suited to limited grazing; severely restricting the tillable lands in spite of extensive areas of flat land with deep fertile soils of the lime accumulating type. The rainfall varies from less than five inches in the west to as much as eighteen inches or more in the Baboquivari Mountains.

241 648 311 In recompense, the aridity has afforded a degree of security, for the area has offered little to hostile marauding Indians, or even to the covetous white man. Few white families could make a living on as much of this land as may support an entire Papago village. The very poverty of his land has been the Papago's guarantee, and his peaceful record is in large part due to the fact that he has had comparatively little provocation or interference. A high degree of adaptation through centuries of adjustment, combined with a low standard of living, have made it possible for over 5,000 Papago to live on about 5,000 square miles of this region, desertic both in climate and resources.

241 The Papago are the premier dry farmers, producing wheat on driest lands where it is known to be successfully grown, with as little as five inches of rainfall or less.[2a] Some years the crop fails entirely, for the rains do not always come. But yields as high as twenty-five bushels to the acre have been grown. A good harvest will furnish wheat enough to last several years, and the Papago have learned the wisdom of keeping a reserve on hand.

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[2] The Arizona Republic, March 16, 1932, p. 1.

[2a] Carl Sauer and Donald Brand, Prehistoric Settlements of Sonora, with Special Reference to Cerros de Trincheras (University of California Publications in Geography, Vol. 5, No. 3, 1931), espc. p. 75.

11: Hoover U-4, 5 (ca. 1930) 1935

NU28 Papago NU28

After a crop failure they prepare for a new crop with as much care as if 241
a harvest were assured.[3]

In the Papago country, dependable sources of water and land which 221
could be tilled were seldom found close together. The Papago adjusted 361
themselves by a compromise between settled village life and nomadism through inter-village migration, commonly between two villages. Those of one type were reserve villages located at the foot of the mountains or in the foothills where there were sources of water that could be relied on. The other villages were out on the open plains adjacent to the fields and were farming communities temporarily occupied. In recent years, with the digging of deep wells near the latter villages, their relative importance has been reversed and the inter-village migrations have lost their seasonal character.

THE OLD HEAD OR PARENT VILLAGES

The present day Papago villages may be traced back to about twelve 361
common centers prior to 1860. Each of these represents a tribe which, 621
spreading from the main village or pair of villages, has established new communities. Some of these parent villages no doubt sprang from a few of the very oldest villages as Kaka, Achi (Santa Rosa), Anegam, Tecolote, and Gue Va (Quitovac).[4] The tribal areas coincide fairly well with the larger units of plains or drainage basins, imperfectly set apart by mountain ranges or groups. The parent villages with their descendant villages are as follows:

1. *Tecolote,* on the Tecolote plain, south of the Quijotoa Mountains had as its companion or reserve village, Cobabi, Sonora. A second reserve village developed at Cabota, also south of the boundary. Tecolote was a rallying point against the Apache, but now its people are scattered in a number of small communities or rancherias on the surrounding plain, such as San Rafael or Papala-vakamukik, and San Ignacio, with Molonites on the western front. The old village site is now virtually abandoned. Tecolote Indians settled Vamori, Poso Verde, San Miguel, and Indian Oasis. They also make up in part the villages of Chulik, Topowa, and Kavolik. A part of the Vamori people came from near Caborca in Sonora.

2. *Kupk* (Copeka), with its descendant villages and people, occupies the Quijotoa plain. Its companion reserve village, San Antone and Kupk itself, have shrunk to insignificance. Kupk was parent to Kavolik, Pisinemo, and Haal Muik, with their reserve village, Poso Blanco; and in recent

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[3] W. J. Spillman, Extra-dry Farming (Farm Journal, March, 1928, p. 22).

[4] See also Carl Lumholtz, New Trails in Mexico (New York, 1912), pp. 355–56.

UNCULTIVATED PLANTS USED AS SOURCES OF FOODS, BEVERAGES, SMOKING, AND CHEWING MATERIALS

1. Foods

The Papagos, like other peoples in the area, exploited 222
the vegetable resources of the desert to the utmost, and the same plant at different seasons would provide not only roots, greens or fruits for food, but twigs for basketry, wood for implements or sap for dye.

In years when the rainy season was late they lived entirely on wild foods without planting at all. When the foods ripened, during or after the rainy season, enough was gathered and stored to last throughout the year, but just
before the giant cactus harvest, food became very scarce, [805]
as is indicated by one of their names for May, *ko'ohk macat*, "the painful moon."

Some foods like the hackberry were simply used by 222
the people in the neighborhood, while others like agave 222
and acorns were gathered by special parties and either 438
utilized or traded. There was one island of unusual flora on Elder Brother's mountain, Baboquivari. Here, near a permanent stream, grew the special luxuries he had provided for his people, and parties went to pick them for trade or on behalf of a village. Certain staples, however, grew in great quantity and these were gathered by everybody.

Different parts of the territory used different magical 241 ●
practices to insure a good crop, the most common being to 222
make effigies of the desired fruits and plant them in the 789
gathering grounds after a night of ritual singing. Sometimes merely an ironwood stake *(Olneya tesota)* was planted [824]
instead of the effigy.

When a crop was reported ripe the village organized 222
its food gathering expedition. If the expedition were for

THE GROWING AND UTILIZATION OF CULTIVATED PLANTS

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The material difference which distinguished the Papagos from the Pimas in the old accounts was their lack of irrigation, consequently they had no cotton or cotton clothing (10, 18). This lack was definitely due to scarcity of water, for in all the valleys where there were usable streams, irrigation is reported. The Papagos were by definition the people who lived away from these valleys. Their planting was usually *de temporal* "thunderstorm" agriculture. That is, the people waited until the ground was thoroughly soaked by the summer rains and then planted their seeds in the moist earth at the mouth of a wash; these crops were often later lost because of insufficient water supply. The Spaniards reported such planting specifically at Saric and Tucubavia (18), and a more comprehensive statement records that this was the usual method for the Papagos north of Casa Grande (10).

Mange (18) reports that some who lived inland away from arroyos did not plant at all, but "live very poorly, naked, on roots, wild sweet potatoes and mesquite beans."

The first Spanish travelers found the Pima-Papago people raising corn, beans, and pumpkins (10). In the first journeys at the end of the seventeenth century, before the Apache raids had become serious, abundant crops are often mentioned (17). The Spanish missionaries made a wide distribution of wheat, kidney beans, lentils, vetch, chick peas, and, according to one account, watermelon (27). At first they reported the people "very diligent in planting" (10), but after a hundred years of Spanish occupancy and Apache raids the complaint was: "They plant very little and the missionary has to give them seeds and tools or they will not plant at all" (10).

After the period of disorganization and migration contingent on the Apache raids agriculture slowly revived. At

241 present irrigation is practiced in the same river valleys where the Spaniards found it, although only one of the irrigated localities falls within the United States Papago Reservations with which the present paper is concerned. This is San Xavier del Bac, outside Tucson. The old residents of this district died out during epidemics and Apache raids, and Papagos from the desert have moved in within the last sixty years to take their places. Through the rest of the area the old Papago settlements plant *de temporal* as formerly. The government wells scattered through the reservation are used for watering stock, and to make it possible for the residents to remain the year around, but they do not affect agriculture.

132 The rainy season in Papagueria is concentrated in July and August, when almost all of the five to eight inches falls. The washes, dry for the rest of the year, are at times filled for a few hours with a torrent of muddy water which sometimes covers the adjoining land to a depth of two or three inches, and it is after the ground has been thus moistened that the Papagos break it up for planting.

132 241 222 In the first bulletin of this series (6) reference was made on authority (22) to the Papago as never having been an agricultural people, depending entirely upon the wild products of nature for their food supply. A study of the Papago as indicated above has shown however that this needs qualification; they do exploit the vegetable resources of the desert to the utmost, and in years when the rainy season is late live entirely on wild products without planting at all; nevertheless, they have at least at times a rather well developed agriculture. July is known among them as the "Month of Rains" and August as the "Month of Short Planting." If the heavy rains are delayed until August, these people sometimes do not plant at all since the growing season is too short to allow the crops to mature before frost. In this event they change their whole scheme of living; they eat the seed-corn and beans and spend the rest of the summer in food gathering and the winter working wherever employment can be obtained.

Most hamlets make some effort to channel the flood 241
water to their fields. Ditches are dug from the wash to 312
the fields situated alongside, the ditch ending in the middle of the field so that the water will flow all over it. If there be several fields, one beyond the other, there may be a main ditch with several branches.

Planting in the old days was never begun until after 241
the first rain ceremony had been held. This was not because it was taboo, but because the soil would be too dry. Any village which found it convenient held the first ceremony and "caused the rain." After that successive villages held ceremonies during the summer so that the rain would continue.

Nothing in the nature of plowing was done until after the coming of the Spanish missionaries. Since then until [177]
rather recently (when the steel plow was introduced), plowing has been done with a plow made from a single piece of mesquite wood *(Prosopis velutina)* (7). Before that the procedure was simply to wait until the ground was moist, then make holes with the digging stick and drop in the seed The digging stick was the same as that in the western Pueblo area and northern Mexico—a straight stick without a footrest, made of ironwood *(Olneya tesota)*, four feet long with a sharp point hardened in the fire. The man using it stood erect and dropped it into the soft earth where it made a hole four to six inches deep. A woman followed, carrying the seeds in a small basket; she pushed a little loose earth into the hole with her bare toes, dropped in four seeds, and covered them with a single foot movement.

In order to get the seeds in as soon as possible before it rained again, the whole hamlet generally worked together. If rain came the same day, the seeds would be washed out; if not for three or four days, they took root. They might be washed out several times in succession, in which case planting would be given up.

The principal work of the summer was keeping the ditches clean but cultivating was also done with the weed

241 hoe. This was a sword-shaped slab of mesquite *(Prosopis velutina)* about two feet long, sharpened on the lower edge.

Crops were harvested in October, giving a growing season of about one hundred days. After being flailed or winnowed, then thoroughly dehydrated on the roof of the house, they were stored in jars or baskets. The Papagos usually hid their food for safe-keeping.

LEGUMES

262 Tepary, *pawi (Phaseolus acutifolius* var. *latifolius)*
241 Kidney bean, *mu:nyi (Phaseolus vulgaris)*
Vetch *(Vicia sativa)*
Lentil *(Lens esculenta)*
Chick pea, garabanzo *(Cicer arietinum)*

241 Freeman (11), who has made a careful study of the beans and teparies of the Southwest, collected two different types of beans from the Indians of southern Arizona. They were recognized by the Indians as distinct, and are commonly known by the names, "Frijoles" and "Teparies." Frijoles belong to the group of common kidney beans *(Phaseolus vulgaris)*, while teparies belong to that large and variable species, *Phaseolus acutifolius.*

The native tepary, *pawi*, a staple crop of the Papagos and from which they received their nickname *pápawi o'otam* (bean people), was grown by Indians of southern Arizona and Sonora and as far west as the Cocopa Indians (13), but its name comes from a Spanish pronunciation of the Papago phrase *ṭ pawi* (it is a bean). The Spaniards found the Papago growing this crop in 1699 (18), and their later reports refer to it as "the small native bean called tepary" (27). The Papagos cultivate at present as many as fifteen varieties of tepary, represented chiefly by different colors (11). However, the one found most valuable for cultivation and for cooking purposes is the white tepary, which grows both as a bush plant and as a climber.

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174 Varieties of tepary have been found growing wild in western Texas and New Mexico, also in Sonora, and it must have been cultivated at an early period since a specimen of

it has been found in pueblo ruins in northern Arizona. "It was excavated in 1931 from site N. A. 1814, which was a masonry pit-house which seemed to be associated with a P. III small pueblo. The tepary was identified by Gilmore at the University of Michigan and, according to Gilmore, it is the only case of tepary being found in a prehistoric ruin. The specimen was carbonized when the site burned."[5] (The date of this pit-house would, according to present reckoning, fall between 900 and 1350 A. D.) It seems to be established that the aboriginal bean cultivated by the Cocopas was the tepary (13). 241 174

Freeman (11) is of the opinion that the tepary was domesticated by prehistoric Indian Races from wild plants growing in the canyons of southwestern United States and northern Mexico. He also believes that the teparies were probably not domesticated from the type form of *Phaseolus acutifolius* A. Gray, but from a larger, more robust, broad-leaved variety of the species, such as was collected by Wright in a valley of Sonora as early as 1854, and described by Gray as distinct, but left unnamed by him, probably on account of lack of material, now abundantly available. However, the careful and extensive work of Vavilov (26) indicates that the cultivated tepary *(P. acutifolius)* is originative of Southern Mexico and Central America.

Planted and grown under dry conditions, side by side with the kidney bean, the tepary has been known to fruit when the kidney bean had not even flowered, and when both fruited the tepary yielded four times as much as the kidney bean. It was no wonder, therefore, that when the season was too short for corn the "bean people" still managed this crop. 241

Frijoles, now grown by the Papago and in the Southwest in general, are probably descendants of varieties introduced by Spanish missionaries, apparently from Mexico. Russell (22), referring to *Phaseolus vulgaris*, states that 241 174

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[5] Correspondence from Dr. H. S. Colton, Director, Museum of Northern Arizona, under date of June 28, 1935.

241 174 "At least one variety of the common kidney bean, pole bean, bunch bean, etc., was known to the natives before the advent of the Spaniards."

241 Teparies and frijoles are still planted at the beginning of the rainy season in holes three feet apart and six inches deep. When harvested the vines are laid on the ground and the beans threshed out with a stick; or if a very large crop, [251] it may be threshed with horses, as is wheat. The threshed beans are dried on the ground or roof and stored in jars. Vetch *(Vicia* sp.), lentils *(Lens esculenta)* and chick peas or garabanzos *(Cicer arietinum)*, all of which have been introduced, are planted in February with the wheat and harvested like wheat in May, but otherwise are treated like beans.

CORN *(Zea mays)*

[262] 243

Red corn	*si-wĭhpĭki huhnyi*
White corn	*to:ta huhnyi*
1. large grains	
2. small grains	
Yellow corn	*s'uam huhnyi*
1. small, irregular grains, like popcorn	
2. large grains, soft	
3. a modern variety, attributed to the Navajo	
Blue corn	*s'tcĭata'ki huhnyi*
1. small, regular grains	
2. large, irregular grains *(ku:pi)*	
Crazy corn, grains of all colors	*tcĭhpawĭ huhnyi*
Laughing corn, mixed red and white, large grains	*hĭhĭhmi huhnyi*

All these varieties are mentioned in Papago planting songs but at present the only ones commonly found are yellow and white. Gifford (13) mentions both a yellow and white and a white soft maize, also a flint maize, grown by the Cocopa under the Papago name of *huhnyi* (corn) and credited to the Papagos.

The different colored corn grains were stored and planted separately and never allowed to mix. When har- [251] vested the grains might be removed from the cob with a

18: Kelly NU28 Papago NU28

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[For author's suggestions on expanding Papago irrigation agriculture, see category 116, pp. 90-93.]

175 pattern is well known, living in an area of between five
101 and ten inches of rainfall annually and located between
131 the Ajo Mountains on the west and the Baboquivari Mountains
132 on the east; and the eastern riverine sedentary Papagos, or "Sobaipuris", living in an area of between ten and fifteen inches of rainfall annually and located between the Baboquivari Mountains on the west and the San Pedro Valley on the east.

175 Papago agricultural techniques were simple.
105 Most fields were small, located at the foot of steep
241 slopes, where intermittent streams emerged at the edge of the flat desert land; at these "mouths" (akchin in Papago), a small cultivated area could be watered, if rain came in the adjacent hills at the right time. Small irrigation channels were used to bring water from larger mountain streams to fields in the flat valleys, but no large-scale development of irrigation was possible such as the Gila
[162] and Salt valleys permitted. Along the Santa Cruz River, however, in the vicinity of the San Xavier Mission south of Tucson, extensive irrigation canals were used in pre-Spanish times and, even though smaller in extent than the aboriginal irrigation systems along the Gila and Salt, permitted a concentration of population at Bac which exceeded the size of any of the Pima villages farther north. (Dr. Bernard Fontana, Personal Communication).

The principal aboriginal crops were corn, beans, 175
and squash, to which the Spanish missionaries added wheat, 105 241
kidney beans, lentils, vetch, chick peas, and possibly [177]
watermelons. These new crops, however, were not grown
in significant quantities until the last few generations.
Wheat could be planted in February and harvested in May, [221]
and corn was regularly planted in July or August when the
summer rains came; thus two grain crops a year became possible,
greatly increasing the agricultural potential of the
area, although it was still limited by the extreme variation
and scarcity of rainfall.

The typical family was made up of the parents, 175
their children, and the wives and children of the sons. 105
Such units were grouped into villages with a tendency for 596 [621]
village members to be related through the paternal line.
Like other southern and western Arizona groups, the family
was the important economic unit, with each family responsible
for its own subsistence.

Religious practices were centered around the 175
recurring events of the annual economic cycle interspersed 105
by many curing and other personal crisis ceremonies. The 796 [771]
regular annual round of ceremonies included as its most [221]
important events a rain ceremony in early summer, after the [361]
gathering of the fruit of the giant cactus, at which the
fermented juice of the fruit was drunk, and a deer dance in
the autumn or early winter when the people had moved into
their mountain localities from the summer field villages.

Schuchk contains but three permanent co-resident 621
groups. There are no churches. During the school year the 361
cook and maintenance man live here. There is a telephone [365]
for general use of the district, and, there is a permanently [162]
residing pair of Anglo families. Thus, with its phone, its
school, its central location for the district council,
Schuchk may be classified as a service center but not a
village.

Tat Momoli (Jackrabbit) and Shopishk (Sif Oidak District). According to two informants living in Gu Komelik, Tat Momoli contains but three families. There is a church, but no feast house. The entry road is in very poor condition and the Catholic priest seldom visits the village.

Only two people live in Shopishk according to one
informant. There is no church and few people visit this
place. Nevertheless, a woman lives here who is somewhat [323]
famous for her pottery.

In addition to the above settlements, there are 361
about 100 locations which are occupied either permanently 221
or temporarily for a wide variety of purposes. In most [233]
instances, they are used by people engaged in stock raising, [241]
or in a combination of stock raising and farming who must
live more or less permanently near their holdings. It must
be recalled that the main Papago Reservation is an area of
4,326 square miles with relatively few miles of improved
roads. Some other localities are used temporarily or

18: Kelly E-4, 5 (no date) 1963 NU28 Papago NU28

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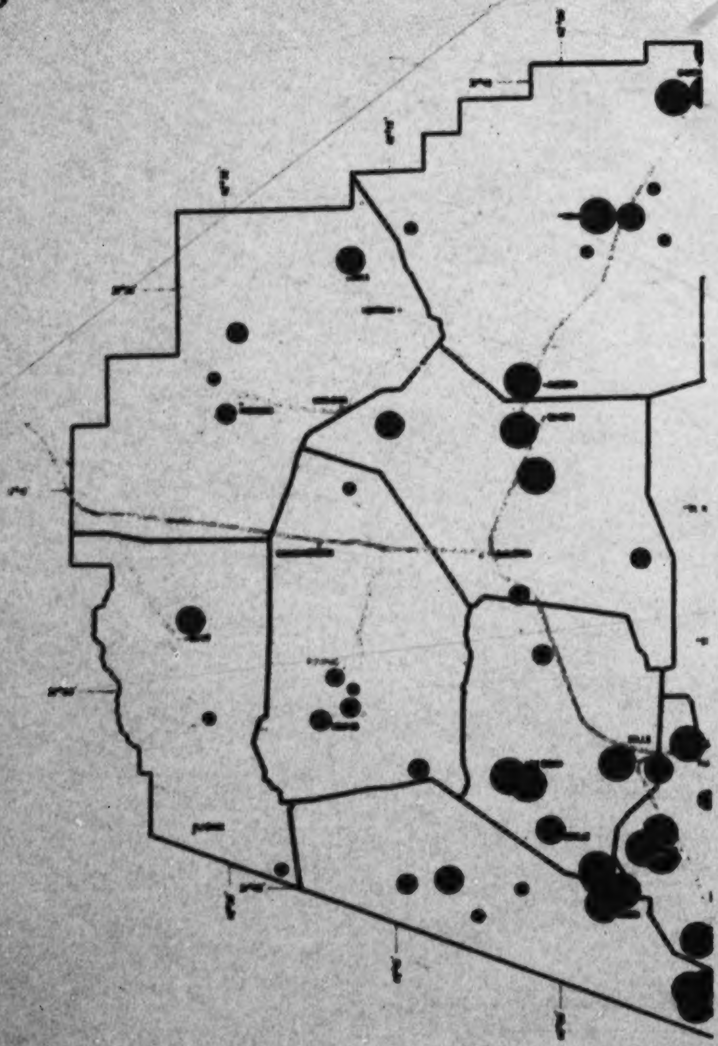

[4.78-A1]

18: Kelly E-4, 5 (no date) 1963 NU28 Papago NU28

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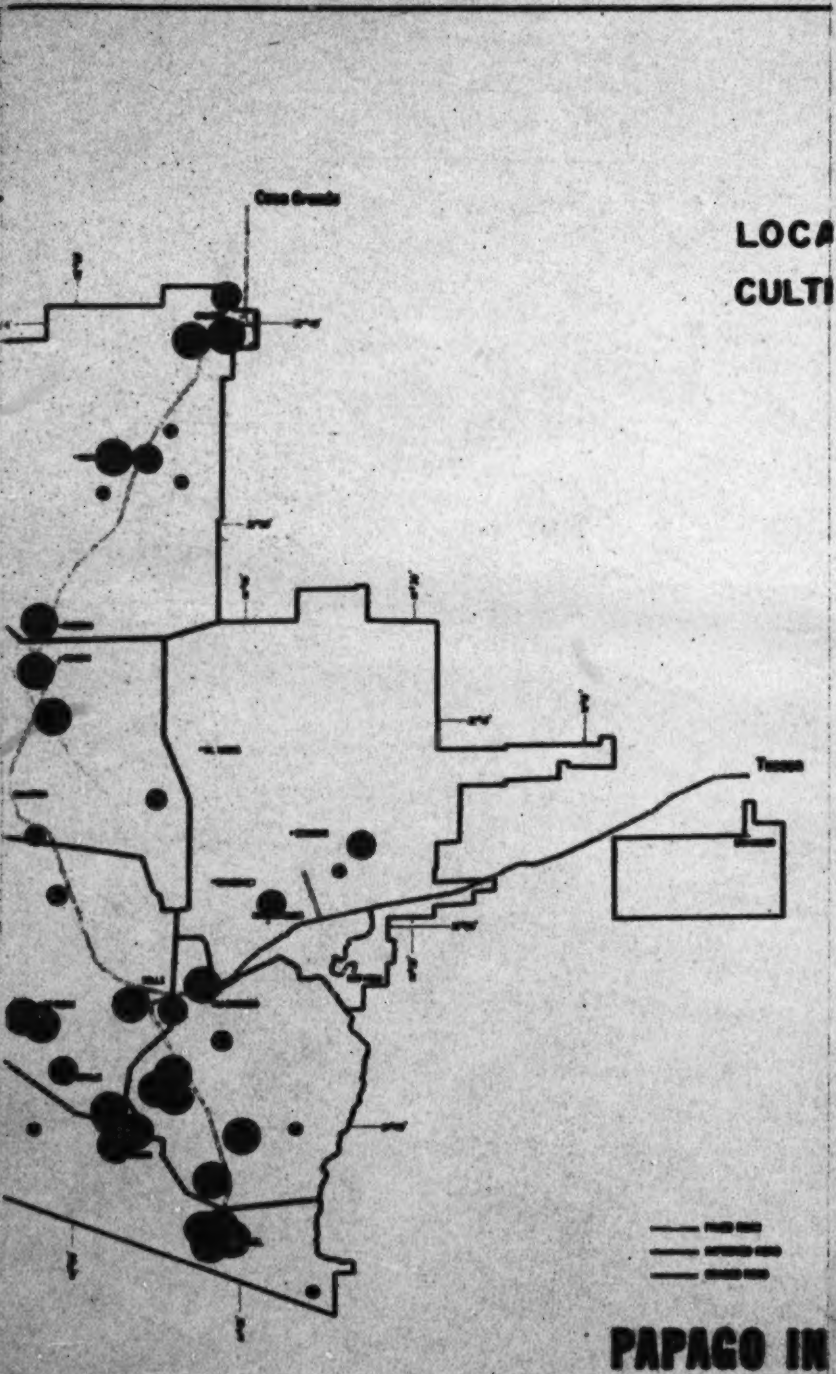
Casa Grande
LOCA
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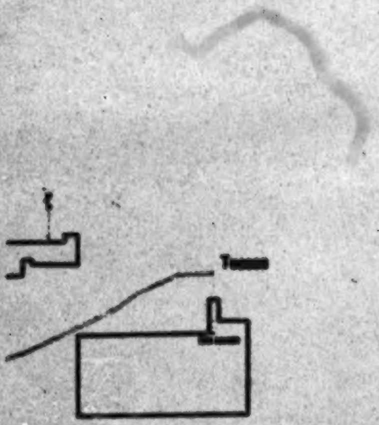
MAP 6
LOCATION AND SIZE OF CULTIVATED FIELDS 1914
(FROM CLOTTS)



● APPROX. 25 ACRES
● " 75 "
● " 150 "
● " 250 "

PAPAGO INDIAN RESERVATION

1961

[p. 78-A3]

233 with this estimate Robert Roether, reservation cattle buyer,
433 is of the opinion that from 25 to 30 families own more than
434 100 head of breeding cows. Both of the above estimates are
422 higher than the estimate provided by the Bureau of Indian
Affairs.

178 Agriculture. Life on the Papago reservations has
433 always depended, and still depends, upon multiple sources of
family subsistence and income. The original pattern was a combination of hunting, gathering, and flood water farming. After 1700, hunting and gathering gradually gave way to cattle raising which, in combination with flood water farming, provided subsistence and some cash income. Farming is now declining and there is being established a new combination: cattle raising and wage work.

● 241 Flood water farming still persists, however, in
spite of periodic drought, back-breaking work, and low
[462] yields. Wherever it occurs today it is usually an activity
[887] of older men who raise a small plot of corn, beans, squash,
[434] and sometimes winter wheat, to supplement their income from
[182] cattle, thus making it possible to live on the reservation
the year around and according to the traditional Papago way of life.

Cash crop or commercial farming, as will be seen later, have not appealed to the Papago since competition from non-Indian farmers and the lack of running water require

trained management and the use of fertilizers, insect control 241
and expensive farm equipment and water pumps.

Flood water farming, as it has been practiced since prehistoric days on the Papago Reservation, consists of the use of surface runoff of rain water at those spots where it could be collected and spread, either at the mouth of an arroyo or along stream beds in the larger valleys. Various names have been used to describe this technique: "akchin farming" (akchin being the Papago word for the mouth of an arroyo), "flash flood farming," and "dry farming." Actually, [177] since the introduction of wheat by Europeans, dry farming, which depends directly upon moisture from rainfall, has been used by the Papago in raising winter wheat. Corn, beans, and squash, however, which must be grown in summer, depend upon flood water which can only be supplied by the artificial spreading of moisture from intermittent streams.

Periodic surveys and estimates made by the Bureau 241
of Indian Affairs show that flood water farming on the main 178
reservation has steadily declined during the past 50 years. 657
How far the decline has gone, however, is not known. 127 In an effort to secure this information the Bureau of Indian Affairs has been systematically carrying out a farm survey during
the past five years. Thus far, only the southeastern part [311]
of the main reservation has been surveyed (Chukut Kuk, [101]
Baboquivari, and the southern part of the Sells district). [634]

241 The survey records 536 acres that are now being farmed,
311 or have very recently been farmed, out of a total of 4,466
634 acres available for flood water farming in this area. The
location and approximate size of these plots, both farmed and idle, are shown on Map 8.

241 Although yields could not be determined, the crops
178 grown on many plots were recorded, indicating an overwhelming
preference for corn, beans, and squash, the ancient and traditional food crops of prehistoric Indians in the Southwest. Watermelons, wheat, milo, peas, and a few other crops, are grown in very small quantities. Thus the chief function of these farms is subsistence which, in fact, is a return to earlier times since as recently as 20 years ago cash crops of winter wheat were grown on much of this same land.

[114] In an effort to determine whether or not a similar
[101] decline in flood water farming has occurred in other areas
[311] of the reservation, a brief study was made by the Bureau of
Ethnic Research in the Santa Rosa, Chuichu, and Gu Vo areas.
241 The situation as it exists in the southeastern section of the
311 reservation was found to be the same in these areas. Indi-
178 vidual farmers were working less than ten acres each and
often only one or two. In each case there was a reduction in the size of family plots when compared with former years and, as in the southeast, many families had abandoned flood water farming altogether.

18: Kelly E-4, 5 (no date) 1963 NU28 Papago NU28

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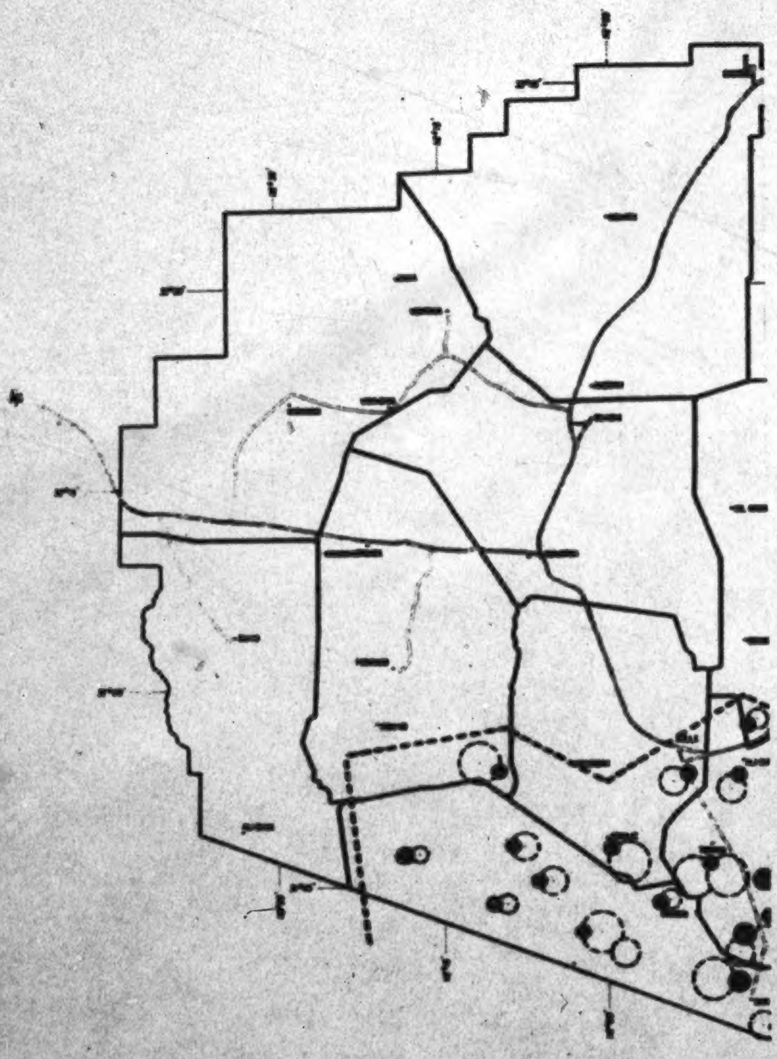

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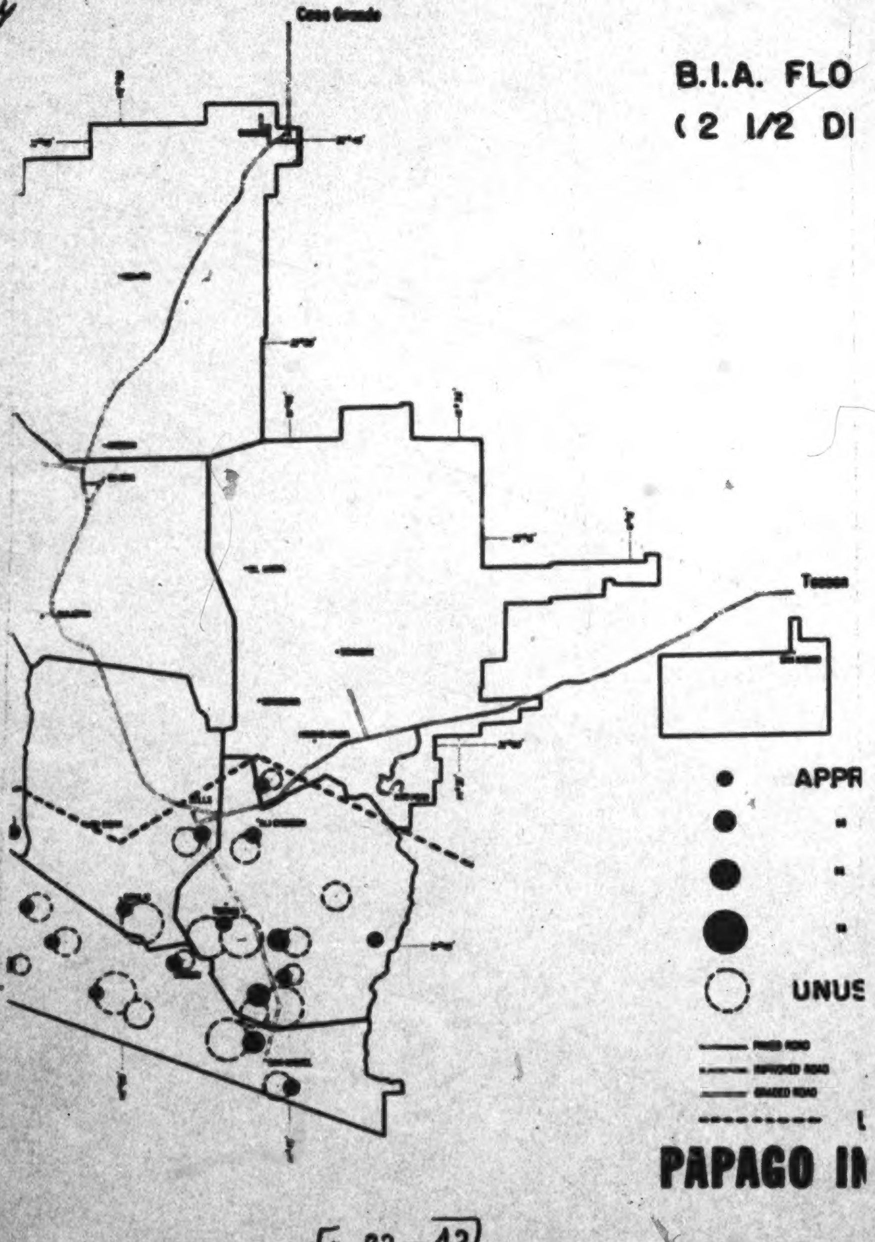
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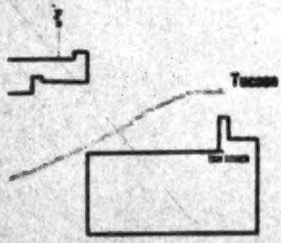
MAP 8

B.I.A. FLOOD WATER FARM SURVEY
(2 1/2 DISTRICTS COMPLETED)



ACRES FARMED 1959, '60, '61

●	APPROX.	25	(1 – 50)
●	"	75	(51 – 100)
●	"	150	(101 – 200)
●	"	250	(201 – 300)
◌	UNUSED ACREAGE IN PLOTS		

[illegible]
[illegible]
[illegible]

--------- LIMIT OF SURVEY

PAPAGO INDIAN RESERVATION

1963

p. 82 – A3

A series of dry years, culminating in a serious drought during the summer of 1962, may, however, account for some of the reduction in flood water farming. In the Santa Rosa area where four farmers were interviewed, acreage had been cut from 125 to 25, and five of the 25 acres had been abandoned after planting in 1962 on account of the drought. 241 311 178 [115]

In the Chuichu area five farmers were interviewed. Thirty-one, out of a possible 50 acres, were being farmed. In the Gu Vo area a few farmers had attempted to farm from three to four acres each but lack of rain had forced them to give up the attempt. [115]

Crops grown in the above areas were the same as elsewhere. The major crop was beans, followed by corn, squash, and watermelons. Other crops included wheat, barley and sugar cane. 241

The significance of the Indian Service farm survey in the southeastern corner of the reservation is greatly enhanced by a previous careful survey, that of Clotts in 1914. The fields and their approximate acreages are shown on Map 6.[2] For the entire reservation Clotts recorded 9,177 acres devoted to flood water farming. For the area covered by the recent survey Clotts recorded 5,537 acres being farmed. The recent BIA survey shows that only 536 of these acres are now being farmed and that the amount of land that could be 241 311 178

[2] [See map on P. 78-A1, A2 and A3 -- Analyst]

241 farmed is now 3,930 acres. In other words, only 10 per cent
311 of the land formerly used is now being put in crops.

178 It may be assumed from our survey, and from other
evidence, that this situation holds true for the entire
reservation. A current estimate of about 1,000 acres in
flood water farming is probably fairly accurate.

241 The reduction in acreage is not surprising. The
433 thing that is difficult to understand is that there should
178 still remain two or three hundred individuals willing to
endure the hardships and the failures inherent in flood water
farming. In 1914 there were few off-reservation jobs, and
fewer Indians willing to leave the reservation in search of
work. Farming, however unrewarding, was required to sustain
[887] life. This situation is no longer true except for some men,
usually the older men, who cannot, or do not, participate in
off-reservation wage work.

241 Irrigated Farming. During calendar year 1962,
311 Papago Indian farmers grew crops on 740 acres of irrigated
land on the main reservation at Chuichu and on 45 acres of
[434] irrigated land at San Xavier. Gross income was $94,755,
[248] more than half from approximately 120 acres planted in
cotton.

241 Since 1952 the number of acres farmed by Indians
311 at Chuichu increased from 530 to 1,360 (1957) but has now
178

dropped to 740. The number of acres farmed by Indians at 241
San Xavier has decreased from 1,125 to 45. New land has 311
been put into cultivation at Chuichu. At San Xavier, land 178
previously farmed by Indians has been transferred to non-Indian leasors or now lies idle.

On the three Papago reservations, 5,275 acres of land in four areas have been developed for irrigated farming: 1,307 acres at San Xavier, 370 acres at Gila Bend, 1,678 acres at Chuichu, and 1,920 acres at Papago Farms.
During 1961 the lease at Papago Farms, which had been given [427]
to a non-Indian corporation for development purposes, was [657]
cancelled and the land was idle until the summer of 1963 when the Bureau of Indian Affairs planted 160 acres in small grains and forage crops as an experiment. For details of farming in the other three areas see Table 14 and Table 15.

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Table 14. Irrigable Land Use and Acreages Farmed by Papago and Non-Indians, Papago Reservations, 1955-1962

Irrigated Areas and Use	Calendar Year							
	1955	1956	1957	1958	1959	1960	1961	1962
San Xavier								
Irrigable Acres	1,376	1,225	1,225	1,225	1,284	1,290	1,307	1,307
Acres Irrigated	677	399	643	525	775	964	942	532
By Papago	677	399	371	288	120	88	105	45
By Non-Indians	-0-	-0-	271	237	655	876	854	487
Acres Idle	699	886	583	700	509	326	259	775
Chuichu								
Irrigable Acres	1,612	1,669	1,678	1,678	1,678	1,678	1,678	1,678
Acres Irrigated	1,324	1,288	1,360	1,034	1,028	560	1,095	740
By Papago	1,324	1,288	1,360	1,034	1,028	560	1,095	740
By Non-Indians	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
Acres Idle	288	381	318	644	650	1,118	583	938
Gila Bend								
Irrigable Acres	212	385	380	346	346	346	480	370
Acres Irrigated	212	385	380	346	-0-	73	160	321
By Papago	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
By Non-Indians	212	385	380	346	-0-	73	160	321
Acres Idle	-0-	-0-	-0-	-0-	346	273	320	49

Table 15. Acreage and Value of Crops Grown on Irrigated Land in 1962, Papago Reservations

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Crop	Chuichu		San Xavier				Gila Bend	
	Indian		Indian		Non-Indian		Non-Indian	
	Acres	Value	Acres	Value	Acres	Value	Acres	Value
Garden	5	$ 2,500	17	$ 8,500	31	0	0	0
Cotton	115	47,840	8	3,000	246	$ 82,900	61	$23,000
Small Grains	200	15,975	20	940	210	19,230	260	17,342
Forage & Pasture	400	16,000	0	0	0	0	0	0
Totals	740	82,315	45	12,440	487	102,130	321	40,342

Gross value of Indian crops	$ 94,755
Gross value of Non-Indian crops	142,472
Gross value of all crops	237,227

The history of irrigated farming at San Xavier and at Chuichu goes back to pre-Spanish times. The San Xavier area was described by Juan Mateo Manje, who visited there in 1697 with Father Kino: 175 241

> "Here the river runs a full flow of water, though the horses forded it without difficulty. There are good pasture and agricultural lands with a canal for irrigation. The Indians harvest corn, beans, and cotton from which they make cloth to dress themselves. Squash, melons and watermelons were also raised. We counted 800 souls in 186 houses." (Karns, p. 92) [133] [286) [162]

Subsistence farming with irrigation from stream flow continued at San Xavier until 1912 with the number of acres 175 241 311

175 planted by Indians ranging from 800 to 1,200. By 1916, with
241 water no longer available from the Santa Cruz River, 1,320
311 acres were irrigated with water from three wells. Indian
[312] farming continued at about this scale until 1953 when the
present abandonment of farming by Indians at San Xavier
commenced. In 1956, as shown in Table 14, a total of 886
[427] acres lay idle. The answer was a program for leasing San
Xavier farm land to non-Indians which commenced in 1957.

241 During 1962 a total of 12 San Xavier Indians were
463 engaged in farming, but mostly in small garden plots. The
smallest of these was one half acre in size.

175 Indian farming at Chuichu has had a somewhat
241 different history. Although known to have taken place,
311 pre-Spanish farming in this area has not been specifically
312 reported. The first report on the area is from Clotts (1915),
who reported that 188 acres were being irrigated from the
Santa Cruz River, but that the building of a canal to Green's
Reservoir up stream had cut off a part of the water to Papago
fields. Commencing in 1931, deep wells were drilled to
supplement and replace the river water and, by 1937, 615
acres were developed for irrigation. In 1955, through the
leveling of additional land and the drilling of new wells
in an area just east of Chuichu, the Bureau of Indian Affairs
made a total of 1,612 acres available to Indians. See Table
14.

The rapidity with which the level of ground water in the Casa Grande Valley is being lowered now threatens the life of the entire Chuichu project. During 1962 the one remaining productive well on the west side was choked with silt during an early fall flood on the Santa Cruz, reducing its capacity from 750 to 250 gallons per minute. Since this well had already been drilled to bedrock at 230 feet, and the water level had sunk to within 20 feet of this point, it was decided not to redrill the well. The result will be the abandonment of all farming on the west side and the transfer of Indian holdings (a farming cooperative) to idle land on the east. 241 133 312 311

Even the eastern section, developed after 1955, is threatened with the lowering of the water table at a rate that may cause its abandonment during the next decade.

During 1962 five Indian farmers were growing crops in the eastern section. In addition, the East Chuichu Project (an Indian cooperative) farmed an area of 80 acres of which 40 were planted in cotton. During 1963 the 65-acre cotton allotment on the western side was moved to the eastern section and management of the new land turned over to a non-Indian operator. 248 311 [474]

Development of irrigated agriculture at Gila Bend and at Papago Farms has always depended upon leases to 241 311 427

241 311 427 non-Indian farmers. Papago Farms is a new development in an area in the western section of Chukut Kuk district which had never been farmed commercially before 1958. A total of 7,500 acres of tribal land was leased in 1957 to a corporation for a ten-year period under a plan that called for ultimate development of 5,600 acres. From 1958 through 1960 the company reported 1,920 acres under cultivation. The following year no crops were planted and the lease was cancelled.

241 311 653 The Papago Tribal Council is now working on a plan to bring this area into cultivation as a tribal enterprise. A similar tribal project is contemplated for the development of 2,000 new acres of irrigated land near the proposed Tat Momolik Dam southwest of Chuichu.

651 Tribal income from farm land during 1961 was derived entirely from the agricultural lease at Gila Bend where non-Indian leasors paid a rental of $4,000 from a gross crop revenue of $22,720.

241 311 657 History and Prospects. Papago agriculture has never lived up to its promise. In 1949 the Bureau of Indian Affairs published a Papago Development Program which was the product of joint planning by Indian leaders and Indian Service technicians. At that time it was suggested that irrigated agriculture could be developed on about 16,000 acres of land at Chuichu, San Xavier, and Gila Bend. At that time there were 2,425 acres actually being farmed on

the three reservations. Thirteen years later, in 1962, the amount of land used had decreased even though, at San Xavier, non-Indian farmers had been brought in to use idle land. Falling markets, a falling water table, and rising costs are perhaps the principal contributing factors in the failure to proceed with plans for the development of Chuichu. The almost complete abandonment of farming by San Xavier families has not been explained. Relatively small Indian holdings, continued division of the land among heirs, and the preference for wage work over subsistence farming are probably the primary contributing factors.

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The prospect for a greater development of agriculture on the reservations has not, however, been abandoned by the Indians nor by students of agricultural economics. Mr. William H. Metzler, who conducted a study on the reservation during 1958 and 1959 for the Department of Agriculture, has estimated from a preliminary report by the U. S. Geological Survey that about 15,000 acres of land on the Papago Reservation could be irrigated from deep wells. He goes on to say (Metzler, 1959, pp. 46-7):

000

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[114]

> "Less than one per cent of the approximately 3,000,000 acres in the reservation is adapted to crop production. Probably half of these 30,000 acres could be irrigated, the rest could be made suitable for flash flood farming. It is probable, however, that the Papagos do not need that much land for flood plain farming. Probably fewer than 300 families would engage in it and most would require only three to five acres each.

[134]

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> "Some Papagos, however, have discovered a wider use for this type of farming. Some families have as much as 40 flood-plain acres devoted to the production of grain and forage crops for their livestock. Since this type of use is feasible, productive use of the entire flood-plain acreage on the reservation might be made.

000

> "The tools and techniques used in flood-farming can be greatly improved so as to reduce the time required for constructing dykes and ditches, and for plowing, planting, weeding, and harvesting. . .
>
> "A much sounder type of agriculture for the Papago family is irrigated subsistence farming. It fits in with their tradition of small farms and home food production. But it also assures adequate amounts of moisture and the timing of application so as to guarantee good yields. It would combine well either with off-farm employment or with livestock production."

Whether or not such a development as Metzler visualizes could be brought about will depend upon the cost of pumping water from deep wells (see Ground Water Report, page 27). It will also depend upon new regulations, opportunities and ideas with respect to land tenure, capital expenditures, and credit, not to mention the attitudes and interests of Papago Indian families. The present generation of Indian farmers, with few exceptions, have not been successful in industrialized large-scale farming. From two to three hundred Papago families have, however, continued to grow subsistence and feed crops on small flood water farms as a source of supplementary income. It is possible that some of these farmers would welcome a more stable farm income through the development of small irrigated plots, and that

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Introduction

000 Time is catching up with the Papago Indians. In 1700
[23] they didn't have domestic animals (save the dog), any
[24] plants domesticated in the Old World, any knowledge of the wheel, and looked and acted very much like naked savages. They started catching up with the Europeans who intruded into their desert domain then, and have progressed through crisis after crisis successfully. But after 250 years gaining, it looks as though they may be slipping back in their race against us.

These dark-skinned natives live in a region where the human picture is repainted in lighter hues every year. Thousands of white-skinned Anglos move to the Southwest from other parts of the country seeking health, retirement, relaxation, or work. Once a Southwesterner was very different from people in the rest of the U. S.– now he is usually just someone from somewhere else.

177 As the region fills up with Anglos who are very much
648 alike, the people who were here before are profoundly affected. For many decades Spanish-Americans and Indians were too isolated to be much changed by a growing flood
[49] of Anglo immigration. But better roads made them accessible to tourists seeking strange sights, and drew for them a distorted picture of Anglo society and ways. Distorted as it was, it helped balance the strange picture sketched by the U. S. Indian Bureau's handful of employees who were almost the only Anglos Indians saw for decades.

WHY the Desert People work

461 464 The Desert People pick cotton because they need the money they are paid for their labor. Cotton harvesting is hard work and dirty, but as one young Papago who picks 300 pounds a day told the author, "$9 a day is a lot of money to me!" Picking cotton is the most practical way for unskilled Papagos to earn any large sum, and Papago cotton pickers superficially come very close to the concept of the economic man governed only by "laws" of economics. But there are deep-lying cultural reasons for this attitude and need among the Desert People.

CHANGE IN VIEWPOINT

177 178 Originally the Papago people lived in a manner quite different than they do today. After unknown centuries in their harsh semi-desert environment, they had worked out a marvelous adjustment to unfriendly nature and a military balance with surrounding Indians. But the Desert People have had some contacts with Europeans for 250 years. During those two and a half centuries, more and more Papago behaviors have changed to approximate European behaviors. Forms, if not meanings, of Papago action are frequently much like our own. Of course, habits and thoughts most central to Papago culture remain Indian in character. The most complete and striking changes have probably occurred in the economic spheres of life.

179 431 437 [224] Once material goods apparently changed hands among the Desert People through a system of gift exchange. A successful hunter divided his kill among families in his village. Later the wife of a good farmer divided some of her tasty dishes so the hunter received an amount roughly equivalent to his meat. Each family was an economic unit if necessary, and no kindred looked beyond its members for aid.

175 190 191 [231] [241] [465] When Spanish missionaries reached the Desert People they set out to change the Indians spiritually and economically. They introduced new crops and domestic animals to the Papagos along with a new religion. Missionaries introduced the Desert People to a work-exchange system, in which Indians were paid in kind for harvesting and other work (and even for attending mass at first)

ECONOMIC NECESSITY

Basic reasons Papagos Work--

433
In a rural area, there are not many choices of
[463] livelihood--farming, mining, lumbering, raising cattle.
The Papago reservations have no timber worth cutting
[657] other than mesquite trees for firewood. The Papago
[313] reservations are the only lands in the U. S. reserved
for Indians which are open to mineral entry by outsiders.
[316] Consequently mining claims are held by non-Papagos,
and profits go elsewhere. The only way the
[464] Desert People can benefit from mines is by selling
their labor to the owners.

241 Farming is risky for the Desert People. Only two
communities have irrigated lands which can be depended
311 upon for crops. The rest must resort to age-old techniques
433 of flood farming where arroyos spread flood
waters from mountains. Spots that can be farmed this
way are not abundant. They are being decreased each
summer as gullies wash out fields and arroyos cover
them with sterile sand and gravel washed down from overgrazed
and eroding slopes above. Flood farming was
never more than a subsistence measure because of the
size limitation on fields, and frequent crop failures
from flooding out, frost, or drought. Today, there is
little incentive to gamble on a subsistence farm for any
Papago able to speak enough English to get a job. For
[464] wage labor means a super-subsistence income, even if a
[511] substandard one by Anglo lights.

Probably every worker on the Papago reservations
241 has noticed the steady abandonment of flood farms. Among
433 Papago cotton pickers with these farms, less than
half apparently bother to plant any crops at all nowadays.[1]
464 Cotton picking starts just about the time fields
need weeding on the reserves, and picking season hits
221 its peak just about the time flood field crops are ready
to harvest. This conflict between flood-farm growing
season and wage-labor season in the cotton fields results
in many Papago laborers not planting crops at all
on the reserves.

433 Another factor discouraging flood farm planting is
241 that these small plots produce only subsistence crops
at best, even if the gamble against drought and over-
461

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[1] 5 families of 11 giving information had any crops at all in 1950.

433 flooding and grasshoppers is won. This subsistence
244 scale, risky enterprise cannot long compete against
[467] the surplus-over-subsistence earned in the cotton
fields.

The crops Desert People working in the 1950 cotton harvest did plant on the reserves were not even on a subsistence scale. The few beans or squash, the patch of melons they actually planted were no more than a supplement at most.

464 Clearly an important reason Papagos sell their labor
471 is that a high proportion do not even have flood farms where they could try to farm if they wished to.
423 Probably nearly half the Desert People picking cotton
in 1950 had no fields.[1]

233 For Papagos who cannot farm, there is still a
433 possibility of raising cattle. However, xerophytic
[137] desert vegetation is not particularly well suited to fattening cattle—thorns don't make fat. Rainfall on
[132] reserve lands is very scanty, and good stands of grass are small and undependable.

231 Among Papago cotton pickers of 1950, nearly half
422 the families owned cattle.[2] However, some of them actually had only 1 cow, and the average number of head owned by each family was only a dozen.[3]

One difficulty for Papago cattlemen is that horses are kept by most families, taking up range that could support more beef animals. These horses are not especially good stock—no one raises horses for export. But the Desert People are still mainly in the pre-
[492] automotive age of transportation. If they don't walk,
[493] they generally must ride horseback or in a wagon pulled by horses. Over three-fourths of Papago cotton pickers in 1950 owned horses.[4] And each of these families kept
[671] 6 or 7 horses.[5] If it were not for an ordinance of the Papago Tribal Council restricting each family to not
[646] more than 10 head of horses, horse population of the reserved lands would undoubtedly be much higher.

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[1] 39 families gave information. 20 had their own fields, or 51%. (Only 2 were in irrigated projects, 5%) Fathers of 3 younger men had flood fields, 8%. So 41% had no flood fields in their extended family.

[2] 19 families of 40 questions owned cattle, 47½%.

[3] 8 families giving information owned 96 head, averaging 12 per family.

[4] 31 families of 40 questioned owned horses, 77½%.

[5] 21 families giving data owned 138, averaging 6.6 each.

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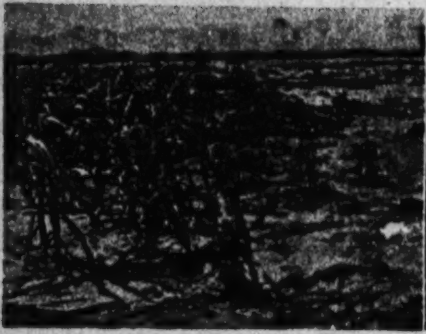
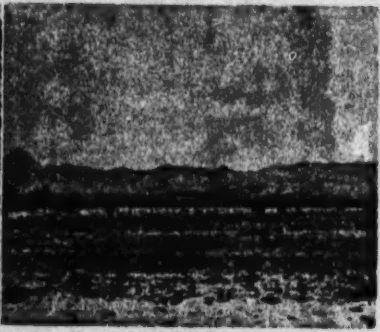


The corn-bean-squash fields are eroding and were always a gamble . . .



wheat stands are thin . . . and often don't ripen . . .

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137

the range is barren . . .

so cattle graze on cactus.

3: Whited G-5 (1890) 1894 NT15 ~~River Yumans~~

Papago NU28

In the spring of 1890 the land was allotted to the Indians in severalty, and it may now be divided as to quality
311 as follows:

	Acres.
Land that is farmed	500
Land that is not now farmed on account of deficient water supply	1,300
Timbered land allotted	5,000
Mesa land, suitable for pasturage, allotted	35,000
Mountain land, including desert land that can be pastured 2 months in the year	28,000

The 1,300 acres not farmed on account of deficient water supply may be farmed when a better and more economical mode of irrigation is adopted than that now practised by the Indians. The 5,000 acres of timbered land is what is usually called mesquite land, from which the Papagos procure their fuel and sell considerable quantities from year to year. The 28,000 acres of mountain land is next to worthless.

There are 94 heads of families on the reservation, and a little more than 5 acres of farming land (land that is farmed) are allotted to each head of a family. The 500 acres of allotted land are surveyed and staked out. The area of land cultivated is diminished, and no progress is being made in methods of farming. Most of their income [1434] seemed to be obtained from the sale of wood and hay cut on the reservation.

AGRICULTURAL PRODUCTS RAISED AND STOCK OWNED BY INDIANS FOR 1889-1890.

● 241

231

PRODUCTS, STOCK, AND LAND.	Number.	Value.
Total value of agricultural products		$6,170
Bushels of barley	4,000	3,000
Bushels of corn	1,000	1,000
Bushels of vegetables	1,000	1,000
Melons	200	20
Pumpkins	1,000	150
Tons of hay cut	200	1,000
Total value of live stock		4,325
Horses owned by Indians	300	3,000
Cattle owned by Indians	150	1,300
Domestic fowls owned by Indians	100	25
Acres under fence	14,000	
Fence made during year (rods)	7,700	

842 All of the Papago Indians living on reservations are in a village near San Xavier church. Their dwellings are mostly rude adobe, with dirt roofs and few windows, and are almost destitute of furniture except the most
493 primitive. There are only 14 comfortable adobe houses. Many of the Indians own farm wagons, though their farming tools are rude and unserviceable. The men all wear the civilized dress; the women also wear dresses
291 similar to those worn by the whites, but leave off their shoes on ordinary occasions. It is claimed that 250 of the
797 Indians living on the reservation are members of the Catholic church.

STATISTICS OF THE RESERVATION PAPAGOS.

162

Whole number living on the reservation		[illegible]
Males	184	
Females	179	
Children under 1 year of age		33
Males	21	
Females	12	
Number married		180
Number over 20 years of age who can read		10
Number who can read and write		10
Number who can use English enough for ordinary conversation		20
Number of children of school age		63

SCHOOLS.—The Catholic church has provided 2 neat, well-furnished schoolrooms adjoining San Xavier church,
658 which will accommodate about 70 pupils. A school was maintained there during the year 1889 by the Sisters of the order of Saint Joseph, without pecuniary aid from the United States. The average attendance for the year ending
797 June 30, 1890, was about 28. In addition to elementary studies the girls were taught sewing, crocheting, knitting, and minor household duties. A few of them became quite skillful in operating the sewing machine. The great drawback to the prosperity of the school was the irregularity in attendance. The school was again opened in September, 1890.

Papago NU28

241 **GRAIN.**—The roving Papagos, those living off the reservation, raise only grain enough, principally wheat and corn, for their own use. Squashes, melons, and sugar cane make up the list of their common crops. Cultivation with them consists in scratching the ground with their stick plows and planting the seed. They pay no attention whatever to weeds. They inclose small fields of fertile ground in the mesas with brush fences and then plant after a rain at the right season. If it rains in November, they plant wheat. Rain in December will insure a good growth of straw, but rain in February will be necessary to mature the berry. The failure of rain in any of the 3 months will prevent planting or about ruin the crop which has been started. Owing to the uncertainty of propitious rains they obtain crops, apart from irrigation, only about once in 6 years.

Their wheat is white, a short, plump berry, of remarkably good quality. In the off years they resort to the reservation, raise a little grain, and "pack" it to their villages. Corn, squashes, sugar cane, and melons are raised after the summer rains.

252 412 They grind grain on an inclined stone, called a metáte, using a smaller stone, about the size of a brick, called a mano, as the crushing power. A handful of whole grain is placed at the top of the metáte, a part of it is scattered over the surface of the stone with a dexterous flirt of the hand, and it is then powdered by two or three energetic rubs with the small stone. The whole process resembles that of washing clothes with a washboard. The flour is caught in a bowl as it falls from the metáte, is clean and free from grit, and contains all the nutriment of the grain.

272 252 [234] Parched wheat, when ground in this manner, is mixed with water, forming a palatable drink, called penole. Corn is never ground raw, but after it has been boiled, and the meal is pressed and rolled up in soft corn husks and forms their bread for journeys. It is superior in taste, in my judgment, to any kind of corn bread made by the whites. They manufacture a kind of cheese from milk, but have no process for butter making.

231 **STOCK.**—The Papagos have small herds of stock and droves of horses. These constitute their substance, but such possessions can not be large in view of the uncertainty of water. Nearly every family has a few fowls. Their wants are few, and those are easily satisfied. They are self-supporting, and no charge on the government for either food or clothing.

493 An occasional farm wagon was found in a village, but in Ki-ki-wah there were 4. This village is about 90 miles from Tucson and 10 from the Mexican line.

224 [439] **GAME.**—Various species of deer abound, and in season the markets of the whites are supplied with venison by the Indians. Mountain sheep and goats are also brought in by them, but in less numbers than deer. Black and cinnamon bears are occasionally killed. The cotton-tail rabbit abounds, and is in demand for the table. The flesh is white, and fully equal to chicken in delicacy of flavor. Dangerous wild animals are also killed by the Indians in considerable numbers. The most formidable of these is the mountain lion. This animal destroys young stock, and is therefore hunted with zeal by the Papagos. The pelts possess a trifling value. The wildcat and civet cat are very numerous. The coyote, fox, jack rabbit, and skunk make up a group of animals which are pests, though not dangerous ones. The jack rabbit is sometimes used for food.

223 **BIRDS.**—Among the birds useful to Indians are the quail, dove, mocking bird, and cardinal bird. These are trapped with great success by them, the quail and dove for food, the others for household pets, their sale forming quite an income. Hawks, owls, and crows abound. Wild ducks, geese, bittern, heron, and snipe are killed in their migration back and forth between Mexico and California. It will be seen that the Indians have many food resources on wing and foot, valuable for consumption or sale.

342 333 **DWELLINGS.**—No tents are used among the Papagos, and about two-thirds of the houses are made of adobe, the rest being constructed of mud and brush. They consist of but one room, and have dirt roofs laid on rafters of small trees. There is no uniformity as to the size of the houses. The adobe bricks are made in an open frame of four compartments from a gray mud or clay mixed with short cut straw or hay. This mold is placed upon the ground, filled with the soft adobe, packed firmly, and then the frame or mold is removed and the brick left to dry. The usual size of a brick is 4 by 9 by 18 inches.

[356] The Papagos are cleanly in their habits. They sweep the dirt floors of their houses, and in some cases the ground around them. No vermin of any kind was found in any of their houses.

291 [177] **CLOTHING.**—The men wear boots or shoes, pants and shirts, and straw or felt hats. A canvas jacket is worn on cool days or on a journey. The women wear shoes, stockings, and skirt, and waist blankets are quite common with both sexes, with the women serving as shawl and head covering. The women sew nicely by hand, using thimbles. They also use sewing machines, of which there were three in Ki-ki-wah.

181 [548] **MORALS.**—The men were generally represented to me to be truthful and honest and the women to be virtuous. Prostitution is said to be unknown among them. This may be due to the fact, as some claim, that wives are taken and abandoned at will. Occasionally a man was found with 2 wives.

[595] Their honesty was tested in various ways on our trip. The outfit of 2 wagons was left unguarded for a whole day when we made the trip from Tacolote to Fresnal and neighboring villages, and not a thing was disturbed. Twice after we left villages forgotten articles were brought to us by men on horseback. These articles would not have been missed, and might have been kept by them with perfect impunity. The Papagos are not addicted to

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